

NORTHERN MANITOBA



MINING
TIMBER AND PULP WOOD
WATER POWERS
FISH AND FURS
AGRICULTURE
THE HUDSON BAY ROUTE

ISSUED BY AUTHORITY OF THE PROVINCE OF MANITOBA
NOVEMBER, 1917

J. A. CAMPBELL
Commissioner of Northern Manitoba
The Fur Men

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WILLIAM HENRY LAMONT

NORTHERN MANITOBA

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Commissioner of Northern Manitoba
The Pas, Man.



Rapids on the Elbow River, a Typical Bit of Northern Scenery.

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Foreword

In the year of 1912 the boundaries of the Province of Manitoba were extended to the north and northeast, adding an area of 178,000 square miles, which gives the Province a total area of 251,832 square miles. The north boundary was extended to the 60th parallel, which is the line of the north boundary of the Provinces of Alberta and Saskatchewan. It extends to the eastern shore of Hudson Bay. The eastern boundary of the added section extends from the northeast angle of Old Manitoba, northeast to where it intercepts the southern shore of Hudson Bay in longitude 89 degrees.

The vast added territory commonly known as Northern Manitoba or New Manitoba, with its hundreds of miles of ocean frontage on Hudson Bay, has remained to this day but little known to the white man. In the earliest days it was the exclusive preserve of the fur traders and trappers.

Traders and missionaries and a few Government surveyors and other official explorers have hitherto been practically the only source of information regarding the characteristics and possibilities of this enormous country. The object of this booklet is to present in summarized forms as much as possible of the information available.

The building of the Hudson's Bay Railway from The Pas to Port Nelson is nearing completion. The length of the railway will be 424 miles.

Recent discoveries of minerals north of The Pas are attracting a great deal of attention to this new country. Details of these discoveries and of the development work to date are given in this booklet. Those who know the country best are agreed that only the edge of the mineral resources of Northern Manitoba has been touched as yet and predict that if prospecting is continued and means of transportation opened up, the mineral development will become very great.

Other resources also await only the opening up of the country. There is much valuable timber and pulp wood, the lakes and streams are reported to be stocked with many kinds of fish, and there are vast tracts of fertile soil. Generally speaking the climate is not much different from the settled part of the Province.



Manitoba a Mining Province

The name of Manitoba has so long been associated with No. 1 hard wheat that it would seem a contradiction in terms to connect it with any other line of production and especially so with something so fundamentally different from its well known staple product as the production of minerals. But with the golden grain must now be associated the golden metal. New Manitoba appears destined to occupy a similar place in the production of minerals to that which the older part of the Province now holds in the raising of wheat.

Northern Manitoba unquestionably has mining resources that only await development to yield immense returns. The known mining area is in the region of a chain or series of lakes and rivers stretching easterly from Lakes Athapuskow, Schist and Flin Flon near Manitoba's western boundary to Herb or Wekusko Lake, a distance of approximately 90 miles. The former is reached from The Pas via the Saskatchewan river, through Cumberland and Sturgeon lakes, and the latter is 11 miles from the Hudson Bay Railway at about Mile 82 (from The Pas). In the former district have been discovered immense deposits of copper sulphide ore, and in the latter veins of gold-bearing quartz which have produced remarkable assays and are now beginning to yield good returns.

As is quite natural, the discoveries were first made, and development work is now taking place at each end of the mineral area, those portions of the district which are the easiest reached by water and rail.

Flin Flon Lake—The Great Sulphide Property

This very important discovery was made in August, 1915, by Thomas Creighton, one of the prospectors for the Hammill-Currie-Fasken syndicate of Toronto. A large outcrop of oxidized ore was found on the southeast shore of Flin Flon lake. Ten claims were staked and they now comprise the property. This was sampled, but owing to surface concentration the metallic content was extremely high. Resampling, after shooting off the top of the orebody, disclosed the fact that the ore would average about \$10 per ton in gold, copper and silver, the copper content averaging 1½ per cent. The orebody has been trenched for 1,700 feet at different points, and it is thought that it will be over 2,000 feet long. It is narrowest at the north end and widest at the south end, where it enters the lake. Here it is nearly 300 feet wide—solid sulphides. The orebody is broken up in some parts of the vein but it is mainly a solid mass.

The extent of this discovery was soon known. The owners succeeded in interesting certain prominent New York and Boston mining men, and as a result a contract was let for diamond drilling the property.

The work started with two drills on March 26th, 1916, and continued until July 15th, 1916, during which time 18 holes were put down and over 6,000 feet of drilling done. While the returns of this work have never been officially announced, it has been learned on good authority that this drilling with only shallow holes proved up over 3,000,000 tons of sulphide ore, which at the normal price of copper would be worth \$10 per ton. Besides, the drilling did not extend over 1,200 feet on the orebody. One can therefore only imagine what a stupendous quantity of ore is likely to be revealed by further drilling. The work done on this property in 1916 cost upwards of \$50,000.

Owing to a disagreement regarding terms no deal was closed out with the New York and Boston people. However, recently an agreement for sale of this property was entered into by the owners with a Toronto syndicate headed by David Fasken, president of the Nipissing Mining Company, and John H. Black, formerly superintendent of the Timiskaming and Northern Ontario railway, several millions being involved in the deal. This syndicate has lost no time and already diamond drills are again at work. Between \$100,000 and \$150,000 will be spent on this property in drilling and development work this year (1917).

Should the results of this work during the year realize anything like the expectations of those engaged therein such a body of ore will have been proven up as to warrant proceeding forthwith with actual mining operations on a very large scale. This will involve, among

other things, the construction of a railway from The Pas a distance of 90 or 100 miles and the erection of a smelter at or near the property. To facilitate these mining operations it is probable that one or more of the water powers of Northern Manitoba will be developed. Straight north of the property there are several rapids on the Churchill river, from which, according to Dominion Government engineers, can be developed over 50,000 horse-power. Besides, there are plans under way for the erection of an immense power plant to use at least part of the 80,000 horse-power available at Grand Rapids on the Saskatchewan river for pulp mills and other purposes. Should this enterprise take shape in the near future undoubtedly some of this power will be conveyed to this and other mining districts for use in mining operations.

The Mandy Mine—Schist Lake

To the Tonopah Mining Company of Philadelphia and Nevada is accorded the unique distinction of being the first to ship out ore as a commercial commodity and thus put Manitoba on the map as a mineral-exporting Province. The mine from which this ore



The Mandy Mine, Schist Lake, with Train of Teams Hauling Copper Sulphide Ore to Head of Navigation at Sturgeon Landing.

is taken is the Mandy mine, situated near the northern end of Schist lake, and the ore is a marvellously rich copper sulphide.

Becoming interested in the north country and wishing a temporary change in occupation, Mr. F. C. Jackson, an engineer employed on Hudson Bay Railway construction, decided to take a trip through some of Northern Manitoba's lakes and rivers with an off-chance of running across a mineral deposit of some kind. He had associated with him S. S. Reynolds, an experienced prospector. The result was a chance discovery, in October, 1915, of a mineral deposit which, after allowing for the very exceptional expense of shipping the ore almost across a continent, will still pay magnificent returns. Mr. J. E. Spurr, one of the best known mining men in the United States, and vice-president of the Tonopah Mining Company, was then in the district, and on being shown a sample of the ore he did not take long to close out a deal whereby his company took over the property on an agreement to properly develop and mine it, the original owner to receive a percentage of the profits. The Mandy Mining Company was forthwith formed, as a subsidiary, for the purpose of developing and operating the mine and the work got under way as soon as possible.

From March to October, 1916, was occupied in surface trenching and diamond drilling, at an expense of \$40,000. Over 100,000 tons of ore were proved up, the larger part being

copper and zinc mixture, but considerable percentage was shown to be clear copper sulphide, assaying over 20 per cent. copper with additional gold and silver values of nearly \$5 per ton. This is all in one lens, but the formation is such that there is strong ground for the expectation and belief that further mining work will open up another lens or more.

A Unique and Successful Undertaking

The working of the Mandy Mine has already resulted in the successful consummation of an enterprise which is probably unique in the annals of mining in Canada. This was the getting out and hauling a distance of 40 miles in the dead of Winter, without any previous preparation, of approximately 4,000 tons of ore, all ready for shipment to a smelter 1,200 miles away.

Early last Winter, on the strength of a report and recommendation by Mr. H. C. Carlisle, superintendent of the company, with headquarters at The Pas, it was decided to mine and let a contract for the teaming of at least 3,000 tons of ore to be hauled across lakes and portages to the head of navigation at Sturgeon Landing. This contract was let to Mr. C. B. Morgan of The Pas, and in the closing days of 1916 the work was commenced. In the course of two weeks camps were erected and the work of hauling the ore had started. Considering the weather and the obstacles to be overcome this is exceedingly quick action, for in that period three complete sets of camps had been built, equipped, provisioned and occupied by a force of 110 men and 92 teams required for hauling the ore. In addition to this 35 men were engaged by the Mandy Mining Company, and Mr. D. M. Haynes, of Denver, consulting engineer for the company, came up to help the work along. In getting out the ore the equipment consisted simply of a boiler, two steam drills, and a derrick worked by horses. At the end of the season 3,600 tons had been got out. All of this is now in the dump at Sturgeon Landing with the exception of 450 tons which had been hauled right through to The Pas, a distance of about 90 miles, and three carloads of this has already been shipped to British Columbia.

When navigation opens the ore now in the dump will be brought down by boat and barge and then transhipped by rail to a smelter. All this ore was got out by surface mining, and the open cut is now down a depth of about 25 feet.

The Government Road

Anticipating to some extent the development of the district, the Provincial Government, through the Commissioner of Northern Manitoba, early in the Fall of 1916 let a contract for cutting out and clearing a roadway across the portage between Sturgeon Lake and Lake Athapapuskow, a distance of about 16 miles, and while the road has not been completed sufficient work was done thereon in the Fall to allow its being used as a Winter road. Thus, owing to this road being available for hauling ore, the mine owners and contractors were able to carry out the above-mentioned enterprise. Had it not been for the work done by the Government in this respect these mining operations would have had to stand over until a later period. The advantage of such a road is therefore apparent, and it is the intention to complete the work and put the road in reasonably good shape for Summer hauling as soon as possible.

In addition to the teams engaged in the work of hauling ore, a considerable number were employed in hauling in supplies and taking out fish from Lake Athapapuskow. At least 120 teams were therefore continuously using this road during the Winter months.

Mining Operations During the Summer

During the Winter the Mandy Company got in considerable machinery and a full line of supplies for the Summer work, as they purpose going ahead with the mining operations and the transportation of the ore to as great an extent as is possible during the Summer months. Last Winter a 52-foot tug was purchased and transported overland to Lake Athapapuskow. This was a notable piece of freighting—14 tons a distance of 65 miles. A stern wheeler and four barges are now being built at Schist Lake for work on



1. Three thousand six hundred tons copper sulphide in dump at Sturgeon Landing, awaiting opening of navigation, winter of 1916-17.

2. Camp Rex Mine, Herb Lake.

3. Open Cut, Mandy Mine, Schist Lake.

4. C. B. Morgan's Camp, Lake Athapapuskow.

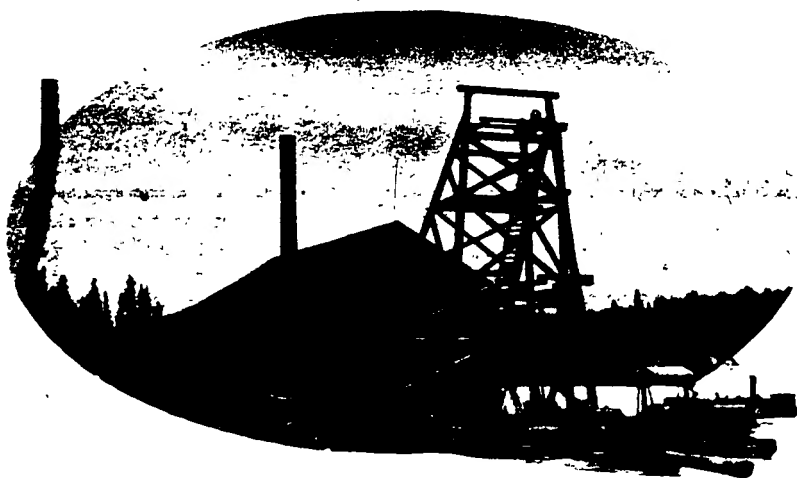
that body of water. The Ross Navigation Company also have another stern wheeler under construction at The Pas in addition to several barges.

There were taken into the mine last Winter a hoisting engine, a 150-horse-power boiler and compressor with all necessary equipment for underground mining, also full equipment for a sawmill which has been set up and is now running. A gas tractor of the caterpillar type, capable of hauling 20 tons, is now on the ground and will be tried out over the portages.

All this work, supplies and equipment involved a big expenditure, and when the machinery above mentioned has been set up and the bills paid to date the Mandy Mining Company will have expended close to a quarter of a million dollars.

Herb or Wekusko Lake Gold Mining District

At the other end of the series or chain of lakes and rivers is Herb or Wekusko Lake where somewhat different conditions are found. The showings here are all in the nature of gold quartz, with slight traces of platinum and other metals. Within the last few months



The Power House and Shaft at Mandy Mine, Schist Lake.

a camp has sprung up here and several groups of claims are now being actively developed. Mr. J. Burr Tyrrell, C.E., well known in connection with northern exploration, some time ago outlined the geology of this lake district and reported favorably on the formations as a probable field for auriferous quartz. His report was read by Mr. M. J. Hackett, an experienced prospector and miner, who was sufficiently influenced thereby to make a prospecting trip into the district in question, and in the Summer of 1914, accompanied by Mr. R. Woosey, he spent some time at the lake and during the season discovered quartz bearing free gold in what is known at the present time as No. 1 vein of the Kiski claim. Before returning from the field, Hackett and Woosey stripped and trenched this lode sufficiently to satisfy themselves that their discovery was valuable. They returned to The Pas and exhibited free gold specimens, which resulted in other prospectors going into the field and staking claims.

Since that time considerable prospecting has been done but it has been confined for the most part to a strip of territory 5 miles long by 2 miles wide, beginning at the Kiski claim at the south and ending with what is known as the McCafferty claims on the north. Various veins have been discovered within this area and several groups of claims have been disposed of to outside capitalists. During the Fall and Winter of 1916, a great deal was done in the way of developing some of the most promising of the claims, cul-

minating in the introduction of mining machinery and the shipment of a car of ore to Trail smelter. The following is a brief resume of existing conditions as to some of the well-known claims:

Kiski-Wekusko Claims

The original discoverers disposed of their interest in these claims, and they are now in the hands of a Toronto syndicate headed by Mr. D. McLaren, a well-known capitalist. Since the change in ownership a few months ago, development work is proceeding apace. A contract was immediately let for sinking a shaft, which is now down to a depth of 30 feet. The average width of the vein is about 3 feet 6 inches. The gangue is well mineralized with arseno-pyrite, chalcoppyrite and free gold is often visible to the naked eye. Mr. McLaren has a full equipment of machinery for this property, but shipment will be delayed until the wagon road from the Hudson Bay Railway to Herb Lake has been completed. In the meantime prospecting will be carried on by means of stripping, trenching, and a thorough sampling of the property.

The Rex Group

This is probably the best known group at the lake. It consists of seven mineral claims adjoining one another. Most of these were located by Messrs. Campbell, Hassett and Moore, well known prospectors. Claims owned by others were added to the group, which was sold last Fall to McKeever Brothers of New York. Their engineer, Mr. Walter Neal, spent considerable time starting operations on the property, and before he left about the end of the year camps had been erected, a steam plant consisting of drills, hoists, pump, etc., had been installed, and the men employed placed in charge of a capable overseer. A recent report is to the effect that Shaft No. 1 is now to a depth of 80 feet, that the values at this depth are high and that the vein is increasing in width. Work has been commenced on No. 2 shaft.

As a result of reports received Mr. Neal has just written as follows: "There is not a shadow of a doubt but that we have a mine there and I believe there, are a good many others similar in the same district. I am perfectly ready to send in an order for machinery for the mill right now on the showing we have, but I shall not do so till after my next visit there, which will be within about a month, as I have to consider the lay of the land in designing the mill."

Moose Horn—The Northern Manitoba Mining and Development Company

The big feature of this company's operations was the shipping recently of a carload, 57,000 pounds, of gold-bearing quartz to a smelter at Trail, British Columbia. The returns for the car have just been received and were \$2,323.60 in gold, an average of \$31.53 per ton—some shipment! This was no handpicked sample but was taken from shaft No. 1 of the Moosehorn in the regular way. The above company is purely a local concern, the organizers being well known engineers and mining men. It is the only company that has as yet put shares on the market. A few months ago a block of stock was sold to residents of The Pas and district at 25c per share, in order to realize additional money required for development purposes. No stock is now on sale.

The work already done on this property consists of a shaft sunk to a 50-foot level. There is installed at the mine a 50-horse-power boiler, 5-drill air compressor, drills, hoists, pumps and other equipment, and Manager Longley expects to have the plant in shape for aggressive mining in a few days' time, and will then continue sinking the shaft. At the 100-foot level drifts will be started both north and south. Channel samples at the bottom of the shaft have given assay returns of \$170 per ton, and the vein has widened from 15 inches to 2 feet.

The Elizabeth-Dauphin Group

After disposing of their holdings in the Kiski and Rex properties, respectively, M. J. Hackett and J. R. Campbell, already mentioned, consolidated their interests in certain

other claims with those of J. M. Wanless, of The Pas, resulting in the above group of four claims being formed. These were sold a month or so ago at a nice figure, and a company, "The Pas Consolidated Mines," is now being organized to develop and operate them. The property shows an exceedingly well defined vein.

Other Claims and Discoveries

In addition to what has already been mentioned, work of importance has been done on various individual claims. The McCafferty lode, to the extreme north of the staked area, has produced some very rich surface specimens and the vein has been stripped for over 1,200 feet. There have been some good showings also from the Nemo, Trapper, Centre Star, Bingo, LeRoi and Ballard.

The fissure in this mineralized zone cuts several formations, namely, chlorite, schists,



Carrying Supplies to the Mines

gabro, quartz-porphyrries and altered gneiss. The values do not seem to be confined to any particular formation.

Road from Railway to Lake

The great need of this camp is a wagon road to connect with the Hudson Bay Railway. Early this year Mr. J. P. Gordon, C.E., formerly assistant chief engineer of the Hudson Bay Railway, who is thoroughly acquainted with the country, made a reconnaissance and survey and marked out a road from Mile 82 to the lake, which line is about 11 miles in length and can be built at a minimum of expense. In this stretch there is a little over one mile of corduroying required, and as it was important that this work should be done before Spring break-up a contract therefor was let a short time ago and the work is now progressing. The Provincial Government have since called for tenders for the completion of the whole road and it is expected the contract will be let and the work commenced in a very short time. The construction of this road will enable those interested to take in machinery, supplies and equipment throughout the Summer and thus the work of mining development can continue without interruption. This condition of affairs is very much appreciated by the many who are now engaged in active operations and others who contemplate starting work at an early date.

This whole mining district north of The Pas is, and has been for some considerable time, attracting very general attention among mining men both in the United States and

Canada. Many of the best known and most capable men in connection with the mining business have personally investigated or sent their representatives into this territory.

Further discoveries have been made and claims staked in other parts of the above-mentioned mineral areas, between Athapuskow and Herb Lake, but no development work has yet been done thereon. Also in different parts of the northern territory outside this area "finds" have been made from time to time at Indian Lake, Piquitona, Kettle Rapids, Cross Lake and other places. Just what these will amount to remains to be seen. But anyone who is at all familiar with the rock formation of this territory and who knows about discoveries which have already been made feels quite confident that this great country contains vast wealth in its mineral resources which are only waiting to be developed. The need of the country, however, is prospectors. Compared with other mineral districts which have been exploited, the discoveries already made have been marvellous when it is considered how few people have been engaged in real prospecting work.

Were it not for the great war with its direct effect on the supply of men and money there would undoubtedly long ere this have been a big rush into the mining and mineral region of Northern Manitoba.

May, 1917.



Views of Wagon Road from mile 83, Hudson Bay Railway to Herb Lake, about 11 miles, showing road under construction and nearing completion in July, 1917.

Through the Mineral Belt of the North

Report of J. A. Campbell, Commissioner of Northern Manitoba, of trip through the Northern Manitoba Mining District with F. H. Kitto, D.L.S., of National Resources Intelligence Branch of the Department of the Interior, Ottawa.

"We left The Pas on June 26th, on the 'Minasin,' one of the Ross Navigation Company's steamers, to which was attached a large barge for carrying ore and other freight. The first stage of the journey was up the Saskatchewan River and into Cumberland Lake through the Tearing River. Thence, after a brief stop at the old Hudson's Bay post at Cumberland House, the course was through Sturgeon Lake to the Landing, at the mouth of Sturgeon River, which point was reached about 7 p.m. of the 27th. There was manifested at that point considerable activity in connection with the loading of ore, construction of the Athapapuskow road and the departure of the various passengers on the boat to different northern points, for it is from this point that miners, prospectors, traders and other parties having business in the north country, branch off in various directions to their different destinations.

"It is from here that the road is being constructed to connect with Lake Athapapuskow. This road runs along the Sturgeon and Goose Rivers for about five miles, then crosses Goose River and takes a pretty direct course for the lake, the total distance being about 16 miles. We walked over the first part of this road, between seven and eight miles, and then took to the canoes, which had proceeded up the river under the guidance of a couple of Indian canoe-men. The road traversed is the one over which the ore from the Mandy Mine was hauled last Winter. It is very good in some places, but requires considerable grubbing and some ditching before it will be satisfactory as a Summer road. This work it is hoped will be done this Summer. On that portion of the road further on Messrs. Burman and Boyd, contractors, have a gang of men at work, their contract being to build and complete the road from the point where we left it to Lake Athapapuskow. Considering labor conditions, good progress is being made. When this road is completed there will be direct communication between the two lakes above mentioned, a very important link in the trans-shipment of freight.

"The land along the Sturgeon and Goose Rivers is of good quality and suitable for agricultural purposes. Several settlers already have gardens which are doing well. Surveyors are at work in this district, and four or five townships will be opened up for settlement at an early date.

Scenic Athapapuskow

"Goose Lake was negotiated in the afternoon and Goose Creek the following morning, when the great Lake Athapapuskow—the lake of many rocky islands—was reached. From a scenic standpoint this lake is one of the most beautiful in Canada. The islands and shores are of rock formation, in some places rising to a height of over 150 feet. They are covered with a thick growth of spruce, poplar, jackpine and birch, the last mentioned being a particularly noticeable and pleasing feature. Ideal camping spots, graduating all the way from almost bare rock to dense bush, are abundant. This lake was crossed in the evening with the setting sun on the one hand and the rising moon on the other. For natural beauty this body of water surpasses anything that we had hitherto seen in any of our travels, and it is bound in the near future to be a mecca for tourists. Besides, from a utilitarian standpoint, evidences are abundant that minerals abound on its shores and islands. Already a number of claims have been staked out, but no development work to any extent has yet been done.

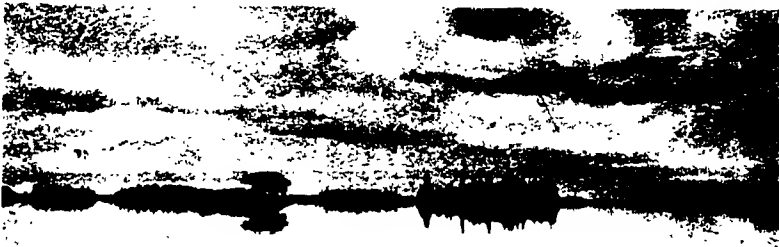
"A particularly beautiful stream, known by the not particularly euphonious name of Schist Creek, is the connecting link with Schist Lake. A seven-mile paddle on the middle of the three arms of this lake brought us to the Mandy Camp, noted for its mining and shipment of 3,600 tons of sulphide ore last Winter. The makeshift and somewhat primitive machinery which was used in this work has been discarded and new modern machinery installed in a large frame power-house, which is now almost completed. We descended the shaft in approved fashion—on the bucket. This is now to a depth of 90 feet. When it reaches 100-foot level it is proposed to start drifting. Work on the power-house is being rapidly pushed to completion. As soon as this is done additional quarters will be erected for the men, these to include a reading and recreation room which will be a particularly attractive feature during the Winter

months. It is intimated that at least 8,000 tons of ore will be got out during the season and placed at Sturgeon Landing for opening of navigation next Spring.

"A small stern wheel steamboat 48 feet long with a 13-foot beam has been completed, along with several barges. This performs a variety of useful functions, mainly the freighting of ore, supplies and timber. The company have also installed and are now operating a sawmill a mile or so from camp. Good spruce and poplar timber is available in the vicinity.

Flin Flon Camp

"From the Mandy Mines a walk over a so-called trail 'estimated' at 4 miles landed us at Flin Flon Camp. This is the most extensive sulphide body of ore yet discovered in the north. Two diamond drills were working on this property steadily last Summer, and they are still on the job, approximately 6,000 feet of drilling having been done already this year. Over 6,000,000 tons of sulphide ore have been proven up, and there is every indication that this will develop into one of the greatest ore bodies of its kind in America. General opinion seems to be that a railway will be built in from The Pas in due course and a smelter erected on the property. These enterprises will result in the opening up and working of a number of other claims in the district where mineral deposits have been shown to exist, and which, owing to their remoteness and the amount of money involved in handling them under existing conditions make their development by present owners now out of the question. The shore of the picturesque little



Typical Lake Scenery—Reed Lake.

lake is already dotted with cabins of those engaged in these development operations and of others who own or are interested in claims in the vicinity.

"We arrived back at the Mandy Camp that night, and next morning started south. It was a pleasant experience as well as an agreeable change to make the return journey down the lake on the new stern wheeler. A channel has been cleared in Schist Creek by removing the boulders therefrom, and the steamer and barge can now navigate this to Lake Athapapuskow, where the barge is transferred to the tug 'Notin' for transportation across the lake to the northern end of the Sturgeon Lake road. This channel, however, will not be navigable in very low water, so the company have cut out a road a mile or so in length connecting the two lakes, and over this road a caterpillar tractor will do the needful in the matter of ore hauling.

"It is, therefore, a very much handled ore that reaches The Pas for transportation—mine, boat, tractor, tug, team hauling, Ross Navigation Company's steamer, another team haul, then finally the railway, but that kind of ore will stand all this labor and expense and still bring astonishing returns.

A Day Trip

"The return trip through Lake Athapapuskow was made in the daytime and revealed additional attractive features. By noon of the next day we had arrived at Cranberry portage, one and a half miles in length, connecting up with Cranberry Lakes. It is a good dry trail through bush with gradual rise and descent.

"The shores and islands of the lakes and rivers throughout the journey are all well wooded, but it is only at certain of the portages that an opportunity was given for getting an idea of the character of the country generally, especially in the matter of soil and timber. The region

in the vicinity of Cranberry portage is characteristic of many parts observed. It is thickly wooded with spruce, birch, jack-pine and poplar, chiefly spruce, the trees being generally from 8 to 20 inches in diameter. On an island in Reed Lake which we visited later the trees were much larger, one of them taking over 10 feet of tape line to go around the butt. There are stretches of good merchantable timber at different points through the area traversed, besides vast areas covered with trees suitable for pulp-wood. This timber is especially valuable for mining work. The Mandy Company promptly availed themselves of this opportunity by erecting and operating a sawmill, and the company operating the Rex Mine at Herb Lake expect to have a similar mill set up in a very short time, and these are simply precursors of many others.

Cranberry Lakes

"Cranberry Lakes consist of several small lakes joined by narrow channels. The general formation of their shores and islands resembles that of Athapapuskow, but these lakes, while quite picturesque, suffer somewhat in comparison with their more magnificent neighbor.

"It is several years since the discovery of sulphide ore was made in this vicinity. To the north a short distance are certain small lakes, on one of which, known as Copper Lake, a number of claims are staked. But, owing to discoveries having subsequently been made at more accessible points, attention has been mainly directed to these latter places. However, prospectors have just come out of the district and exhibited samples of sulphide ore which contain a variety of minerals, including silver. They state they have discovered an immense body of this ore, and careful assays are now being made to find out exactly the values as far as possible. A gentleman representing Duluth capitalists who has been looking around the district has taken an option on some of these claims, and it is probable some development work will be done shortly.

"Between Cranberry and Elbow Lakes there is a stretch of country that is different from any that has been visited. It is in the nature of low lying level valley varying in width from three quarters to about one and a half miles, and on either side is a high rock wall. The river meanders through this valley in a most tortuous manner, sometimes running along the rock on either side. At times the banks are grassy meadows, again trees bend over and dip their branches into the stream, and at almost every turn there is a pond of water lilies now in bloom. The whole course is of the kind the tired city dweller would picture in his (or her) mind for a restful summer canoe trip. From a practical standpoint it might be pointed out that this piece of country being composed of alluvial soil is very fertile, and might easily be made quite productive in the way of raising root crops and cattle.

Elbow Lake

"Elbow Lake is well named. After pursuing a course almost north, the route is now straight south, so that after canoeing 12 miles or so one is back within a short distance from starting point. In the Elbow River are numerous rapids and falls, making several portages necessary. The banks are of rock formation, well wooded. In many places the course has to be steered between boulders. Along the water's edge on each side is a fringe of long bright green joint grass with black tops. Altogether this river opens up a series of natural pictures worthy of special remark. Throughout the course are to be seen the location stakes of the prospectors, but only the edge of this district has been touched in this respect.

"Reed Lake was traversed in the afternoon. It is one of the larger lakes of the series, and the scenery to some extent resembles Athapapuskow, but not so diversified. It was an afternoon like what one reads about in glowing descriptions of sunny Italy, with blue skies, placid lakes and dark green foliage. All the notable features of such a description were there that afternoon in one of northern Manitoba's lakes. There are several settlers at different points on the lake, mainly engaged in the fishing industry, and raising vegetables as a side-line. From Reed Lake to Wekusko or Herb Lake the main feature is Sandy Lake, so called presumably from the fact that there is a small piece of hard sand beach at the end of the portage. Otherwise the shore formation is similar to that of the other lakes, only more regular. The discovery of sulphide ore on the south shore of this lake was made some time ago, and on the north shore for a distance of about a mile there is an immense deposit of red granite. The waters of this lake are discharged into Herb Lake by a short river, at the mouth of which are the Wekusko

Falls, a series of falls and rapids in which there is a descent of 45 feet, and which therefore offer excellent facilities for development of power. The journey across Herb Lake, a distance of about seven miles, was made in the evening, and we arrived at the camp of the Northern Manitoba Mining and Development Company shortly after 9 o'clock, just at sunset.

Moosehorn and Rex

"The changes which have been wrought in the eastern shore of this lake during the last year are very noticeable. On a number of properties active development work is taking place. The Moosehorn and Rex claims are now in the category of real mines. On the Moosehorn, other-



Above—At the Head of Navigation, 55 Miles from Mouth of Nelson River
Below—Hayes River, just above York Factory.

wise known as Northern Manitoba Company's property, a complete mining plant has been erected. The shaft is sunk to a depth of 80 feet, and the vein has widened out from 15 inches on the surface to 30 inches and the ore values have increased with the depth. One shaft on the Rex is down 117½ feet, and drifting is being commenced at 110 feet level. The mean width of the vein is 49 inches and the assays through-out have averaged \$36. Mr. Neal, the chief engineer for Makeever Brothers, when on a visit to the mine in May, found conditions so satisfactory that he immediately ordered a complete new outfit of mining and milling machinery. Most of this is now at The Pas, and Mr. Neal is back to superintend its transportation to the mine and the installation there. The main items in this shipment are as follows:

"Ten-foot Lane mill with a capacity of 40 tons per day.

"Amalgamating plates.

"Two Deister Overstrom concentrating tables.

"The engine is 55 h.p., and there are two 60-h.p. return tubular boilers and 390 cubic feet air compressor with modern equipment of air drills. In addition, an assay office will be established and further buildings erected to accommodate a crew of 40 or 50 men. There is also being brought in as a necessary adjunct a portable sawmill and equipment and two gasoline launches.

"The Kiski-Wekusko claims have been thoroughly prospected by stripping and at least 20 veins uncovered. A shaft has been made to a depth of 53 feet. On the completion of a wagon road to the railway, machinery for this mine, which has already been purchased, will be brought in.

"Work is progressing on the Elizabeth and Bingo claims. The former is one of the best looking veins on the lake, and while the vein in the latter is narrow, this is compensated for by its extraordinary richness. The owners of other claims in the district, such as the Ballard, Le Roi, etc., are getting satisfactory results for the work performed. The McCafferty claims, some distance farther north, have been attracting considerable attention, and a representative of certain Ontario people has been on the ground for some time and is negotiating a deal which has every appearance of being closed out.

"A recent discovery which is attracting particular attention is that of the Syndicate claims on the other side of the lake right across from the Rex mine. A number of prospectors and miners have visited this property, and while no work of any moment has been done thereon, they are practically unanimous in reporting that surface indications show a particularly rich vein, 3 feet or thereabouts in width, and well defined.

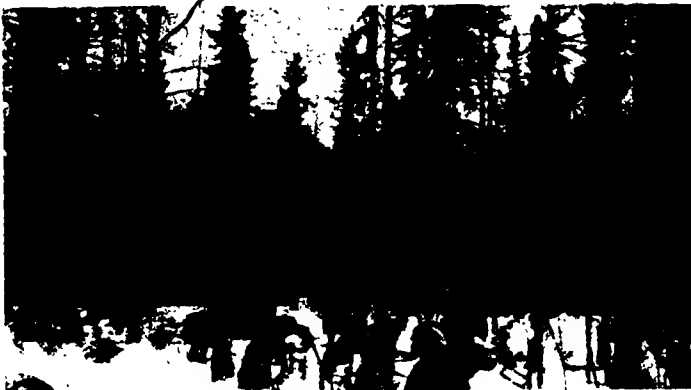
Lake Terminus

"The mining district is about 10 miles from McKay's Landing at the foot of the lake, where there is a fine sandy beach backed by a grove of big trees. This is the lake terminus of the Gordon road from mile 82, H.B.R., a distance of about 11 miles. The road has been under construction for some months, and is now nearing completion. The laying of about 1,500 feet of corduroy and some drainage are the main items yet to be attended to. The completion of the road will be a great boon to the mining district, as quantities of machinery and supplies are now awaiting this event. The country through which the road passes has various characteristics. About two and a half miles is flat limestone, almost like a pavement. There will be nearly two miles of corduroying through muskeg. The remainder is clay and moss land.

"Altogether there is a considerable quantity of land in the vicinity of Herb Lake which can be brought under cultivation, with excellent results. There are now a number of small gardens and patches of potatoes. At one of the mining camps we had the pleasure of eating fresh lettuce and radishes grown on Campbell's Island, a short distance from the shore. The growth of these has been exceedingly rapid and the quality was of the very best. Mr. Campbell has a considerable clearing and a diversified crop of garden stuff, all doing well. G. Lacroix, of mile 82, H.B.R., has an acre of potatoes and from present appearance he is entitled to expect a record crop.

"After walking over the new road we were fortunate in catching an extra train on the railway, and arrived back at The Pas on the evening of July 10th, having made the round trip in exactly two weeks."

July, 1917.



On Winter Trail, Hudson Bay Railway to Cross Lake.

Late Developments in Mining Camps

Developments in the mining districts north of The Pas since the preceding reports were written are set forth in the following short article:

Flin Flon and Schist Lakes

The Provincial Government road between Sturgeon Landing and Lake Athapapuskow has been completed and a great deal of freighting is being done over it. The Mandy Mining Company have let a contract for hauling a minimum of 7,500 tons of copper ore to the Landing. This work will be done during the Winter months and it will be necessary to have over 200 teams on the job. Next Summer the ore will be transported by the Ross Navigation Company, by lake and river to The Pas.

In August Major Walter Karri-Davies, Henry C. Perkins and William Wallace Mein, prominent mining men from San Francisco and New York, visited Flin Flon property in company with John E. Hammill and John E. Black, members of the controlling syndicate, and as a result it was decided to put two more diamond drills in operation on there at once. Major Karri-Davies "wrote up" the trip in the *Mining and Scientific Press* of San Francisco, and the following is an extract from the editorial comment of that journal:

"Undoubtedly the discovery of large bodies of copper-sulphide ore in this part of Canada is a notable event. It is likely to lead not only to the development of one or two big mines, but it will furnish a new point of departure for intelligent exploration in a vast region full of possibilities. . . ."

"The presence of the precious metals in the copper lodes is of particular significance and encourages the expectation that a local mining industry of some importance may be established. American capital is participating in the development of the region and we venture to add that the Canadian people at this time are particularly friendly to enterprise originating from this side of a frontier on which no fort has been built or is ever likely to be built. Cordial co-operation is assured."

Wekusko or Herb Lake District

A good traffic road now connects Mile 82, Hudson Bay Railway, with the lake and a telephone line is being erected along it. The first freight taken over the new road was a saw mill for the Rex mine. Sawing was commenced immediately and as a result a large frame mill house and other buildings have been erected at this camp. Most of the machinery previously referred to has been set up ready for the Winter work.

A mining deal of considerable magnitude has just been consummated whereby the Mines Exploration Syndicate, managed by Makeever Brothers, have obtained control of the Elizabeth-Dauphin group. The transaction was put through with The Pas Consolidated Mines, who have done considerable development work on the property during the Summer. This work has shown such promising results as to make it very attractive to the Makeever syndicate who are now developing and operating the well known Rex camp. A great deal of money will be spent on this work in the near future and 60 to 70 men will be employed steadily during the Winter.

The "Syndicate" claims, about which there was considerable stir when they were located a few months ago, have recently passed into the hands of a Pittsburg capitalist and his associates who have had experienced men investigating mining conditions in the north for some time. This property shows a great deal of free gold, and is generally looked upon as a likely producer. The work of sinking a shaft well be commenced forthwith.

The results obtained in the northern mining district in the space of one year have been truly marvellous and those who know conditions best assert there are only small indications of what is to follow in succeeding years.

November, 1917

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The Mineral Belt North of The Pas

(Report of Prof. R. C. Wallace and J. S. DeLury, Department of Geology and Mineralogy, University of Manitoba)

At the northern edge of the limestone a band of Keewatin and Huronian rocks extends eastwards from Beaver Lake almost uninterruptedly to a point on the Grass River, fifteen miles east of Herb Lake. The belt is approximately one hundred and twenty miles long, and of very irregular width. The average width is probably fifteen miles. With the exception of the western margin of this belt, from Beaver Lake to Flin Flon Lake (a distance of fifteen miles) the area lies in the Province of Manitoba. The centre of the belt is sixty miles north of the Town of The Pas, which is the natural point of communication with the district. It has been realized for several years that there were possibilities of mineral wealth in this belt, but not until two years ago, when certain gold discoveries were made on the north-east shores of Beaver Lake, did prospecting become active. In the eastern part of the belt, the Hudson Bay Railway has been of service in opening up the country, and in stimulating prospecting, as contact may be made with the belt at several points on the line. While the main area is north of the railway line, isolated patches which form its eastern continuation are intersected by the railway line at Halfway Lake and Wintering Lake, and others may yet be discovered between these points and Split Lake.

Geological Features

Through the work of Mr. Tyrrell and Mr. McInnes of the Geological Survey of Canada, the Keewatin-Huronian belt north of The Pas was delineated, and the possibility of mineral deposits was indicated before actual discoveries were made. Since the discovery of gold at Beaver Lake, Dr. Bruce, of the Geological Survey of Canada, has spent three seasons in the district, preparing a map which will define the geological relationships, and will cover a large amount of ground hitherto unmapped. Only those geological features which are of special interest in connection with the genesis of the ore bodies need be referred to here.

Three geological phases are represented in the district: (1) the outpouring of lavas, mainly basic, but in part acidic, occurring as massive and ellipsoidal basalts, sheared greenstones, and sericitic quartz porphyries; (2) the deposition of sediment on these lavas, shown as fresh and sheared conglomerates, with pebbles of granite, quartz and jasper, and very commonly as sheared quartz, etc., which have developed into sericitic schists, hardly to be distinguished from the acid igneous eruptives; (3) the intrusion of masses of granite which flank the whole belt on the north side. The granite is frequently dark grey near the contact, but usually pinkish further from the rocks, which it intrudes. To this granite, or to certain crops of this granite, are to be ascribed the sulphide bodies and the mineralization of the quartz veins. While the sulphide bodies, and with few exceptions, the mineralized quartz veins, occur not in the granite, but in the basic eruptives or the sediments, the presence of isolated crystals of arsenopyrite, a mineral characteristic of the mineralization of the district as a whole—in the massive granite, is significant of the origin of the ore deposits. Some staking has been done on quartz veins in the granite, but practically all the discoveries made up to date are on the northern edge of the eruptives and sediments in close proximity to the granite. This granite has not only mineralized the rock which it intruded, but has in places changed it to a very marked degree. This is the best illustrated at the north east end of Herb Lake, where a fine grained sediment has been metamorphosed into a coarse staurolite schist, which grades off on the further side from the granite, into a garnetiferous schist.

Southwards, the belt disappears underneath a reddish limestone formation, which was deposited much later than the youngest of the rocks hitherto described. There is consequently no "contact" with the limestone in the sense in which the term is understood by the prospector, and consequently no foundation for the somewhat widespread belief that the edge of the limestone should be good prospecting ground. In one sense, however, the limestone has been of undoubted economic importance. It has, to a large extent, protected the comparatively soft Keewatin-Huronian belt with its ore deposits from pre-

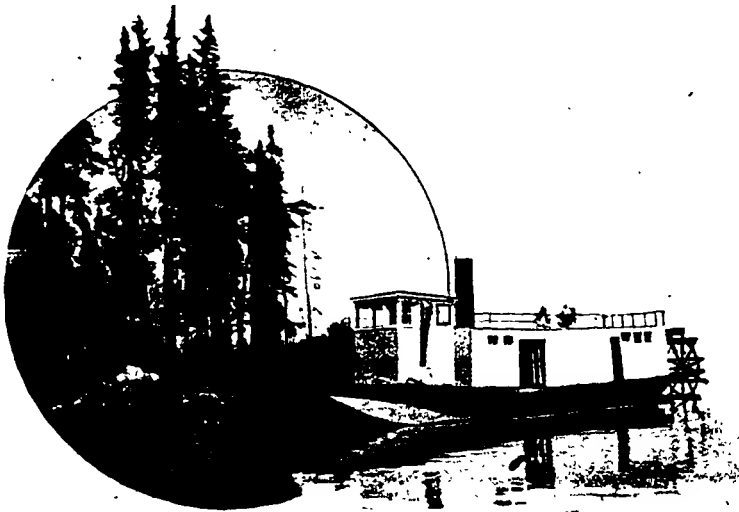
glacial and glacial erosion. But for the protective capping of the limestone, which extended much further north than its present limits, the whole belt would have been completely eroded away.

The Ore Deposits

Two types of ore deposits occur most prominently in the district: (a) sulphide ore bodies; (b) gold quartz veins. The characteristics are distinctive, and the types may be conveniently discussed independently.

The Sulphides

Widespread interest has been taken in the district since the discovery was made last Autumn, of large bodies of mixed sulphides on the east side of Flin Flon Lake. Subsequently a similar ore body was found on the west side of the middle arm of Schist Lake, and more recently sulphides have been discovered on Athapapuskow Lake, Copper Lake, and Sandy Lake. As a rule, the sulphides occur in basic or intermediate volcanic rocks, in close proximity to the younger granite. They have been formed as replacement deposits in zones of weakness along fault planes or planes of brecciation. The petrological char-



Stern-Wheeler of the Mandy Mining Co. on Schist Lake.

acter of the replaced rocks seems to have been of less significance than the brecciation, as in practically all the ore bodies examined. unmineralized horses of similar rock to that replaced occur in the centre of the ore bodies—the rock of the horse not having been affected by the shearing. No quartz accompanies the ore bodies.

Up to date two sulphide bodies have proved to be of considerable economic importance. They are located respectively on the south-east end of Flin Flon Lake, and on the west side of the middle arm of Schist Lake. Both properties have been cross trenched to expose the unweathered ore, and the deposits have been prospected by diamond drilling.

Owing to business negotiations pending on the properties, the results obtained by diamond drilling are not available for publication, consequently attention is here confined to the surface evidences. The replacement ores are sulphides of copper, zinc, iron, lead, arsenic, with gold (chalcopryite, zincblende pyrite, arsenopyrite, galena, more rarely pyrotite, with oxidation products—chalcantite and covellite.) The massive ore at the centre of the deposits is mainly copper pyrites, banded with zincblende. Towards the margins, copper sulphide gives place to pyrite, which grades insensibly into unmineralized schist. At Flin Flon Lake the ore body strikes slightly west of north, and dips steeply eastwards. The maximum surface measurements of the mineralized zone may be taken as

1,900 feet in length, and 200 feet in width, the ore appearing on two points on the east side of the Lake, covered in part by a small bay between these points, and broken by a large mass of unmineralized rock. The measurements consequently include a good deal of country which is not strictly on surface showings, ore body. At Schist Lake a very compact deposit is well shown by trenching with a similar strike and dip to that at Flin Flon Lake. This body is 420 feet long and 75 feet wide (maximum measurements) at the surface, with an almost solid mass of chalcopyrite and zincblende—25 feet wide in the centre, the sulphides grading into pyrite on both sides. There are distinct evidences of shearing and brecciation in the zone in which the ore body has been deposited, and the zincblende has probably been introduced subsequent to movements which have affected the copper sulphides.

An interesting and important feature in connection with these and other sulphide bodies in the district is the extensive weathering of the surface ore. The oxidation is unusually pronounced for a highly glaciated country; even at the bottom of trenches 10 feet deep the evidences of weathering are general. Where the sulphides are exposed at the surface they are coated with a red rust, which serves as an indication to the prospector; but owing to the fact that the sulphides have formed in zones of weakness, they have as a rule been weathered to a lower level than the surrounding country rock, and are now to be found in the valleys covered by glacial drift, or even by the waters of the lakes. For this reason only a very thorough prospecting will reveal all the sulphide deposits. At Sandy Lake, immediately west of Herb Lake, a fairly extensive sulphide zone has been found near the east end of the lake, practically on the granite contact. Iron sulphide (pyrite and some pyrrhotite) with traces of copper sulphides, occur disseminated through a soft, carbonaceous schist. Sulphide bodies are also reported from Copper Lake, Athapapuskow Lake, and the Pineroot River. While certain of these deposits may be of little economic value, their wide distribution throughout the belt is an encouraging feature, which will undoubtedly stimulate intensive prospecting for copper-zinc sulphides such as are being developed at Flin Flon and Schist Lakes.

The Quartz Veins

The first mineral discoveries in that part of the belt which lies within the Province of Manitoba were made on Herb Lake, where gold was found in a quartz vein on the Kiski-Wekusko property. Since that time several veins have been discovered on the east side of Herb Lake. Staking has also been done on the south side of Island Lake, on Little Herb Lake and on Thicket Portage. In the principal district, the east side and north-east end of Herb Lake, the veins occur in a sheared sediment or in a basic volcanic which borders the sediment on the east side. The strike is north, or somewhat east of north, and the dip uniformly towards the east. The quartz veins are lenticular—in places 10-12 feet wide, narrowing down to stringers or even disappearing; and again widening when followed along the shear zone. The heaviest veins occur in the Rex group, and the Kiski-Wekusko property, the average width being somewhat over 3 feet. The characteristic mineralization is arsenopyrite, which occurs practically solid in the walls, and disseminated in stringers in the veins. Copper pyrites, zincblende and galena are found sparingly, and the gold occurs in good showings in a white saccharoidal quartz. Though the walls are highly impregnated with sulphide, the veins are only sparingly mineralized. Tourmaline is almost invariably present.

On the Kiski-Wekusko property, two main veins have been stripped continuously for 500 feet and 700 feet respectively, while the single vein on the Rex property has been followed approximately 1,900 feet. These distances do not represent all-quartz veins, but well-defined shear-lines more or less continuously filled with quartz. Frequently also small stringers, no doubt connected with the main veins, have invaded the country rocks, and may be traced considerable distances from the main body.

Nearer the contact with the granite which lies west of the sedimentary band, the veins are more irregular in length and in width, but show good surface values in gold. The Ginger Claim and the molybdenite property at the north end of Crowduck Bay are in

the granite. The situation is reported to be similar at Little Herb Lake, while McCafferty's lens-shaped vein is practically on a contact zone.

A line of claims has been staked in greenstones on the south side of Island Lake, as a result of the discovery of a very rich float rock on the shore of the Lake. The vein from which the float has been broken off has not yet been found.

Other Mineral Occurrences

Mica occurs in fairly large flakes in pegmatitic veins on the west side of Crowduck Bay, and a quartz vein on the Grass River, immediately below Crowduck Bay contains good showings of molybdenite. Magnetite is reported from an eastern part of the area, but the occurrence was not visited.

General Situation

The value of the sulphide bodies depends mainly on two factors on which authoritative information is not fully available: (1) The average percentage of copper and gold in the ores; (2) the vertical continuation of the ore-bodies. There is a reasonable assurance that two of the sulphide deposits—that at Flin Flon Lake and that at Schist Lake—will become mines of some importance, and that many sulphide bodies may have developed irregularly along the same or similar lines of weakness and are now covered, in low ground, by overburden of clay or unmineralized rock. On the quartz veins development has not proceeded beyond surface stripping. The very extensive mineralization and the size of the veins are favorable features. The veins will, however, undoubtedly prove to be lenticular vertically, as they are already shown to be horizontally. The feature which augurs best for the district is the fact that in a short year of prospecting so many and so varied mineral discoveries have been made in so large a district by a very small but very energetic body of workers.

September, 1916.



The Portage at Grand Rapids on the Nelson River.

Northern Manitoba as a Mining Country

By J. B. Tyrrell (Toronto)

Consulting Mining Engineer

Those who have made a study of Canada's mineral resources and who believe that the country has vast reserves of mineral wealth stored away for the use of this and future generations, and that she has just begun to distribute a little of this wealth to those who search for it, know well that the old Keewatin Greenstones, together with the conglomerites, porphyries, and diabases which are usually associated with them, are the rocks favorable to the occurrence of the precious and semi-precious metals that now form such a large proportion of the mineral production of the Dominion. Last year the Canadian production of gold, silver, copper, nickel, cobalt, molybdenum, asbestos, etc., all of which are largely derived from these old Greenstones and their associated rocks, had a value of about one hundred and five million dollars. Iron, zinc, lead, and many of the rare metals and minerals, may also be expected to contribute their quota to the riches to be derived from these rocks.

A large area of the Greenstones, etc., was shown to exist in Northern Manitoba as a result of an exploration which I conducted for the Dominion Government about twenty years ago.

At that time this country had not been incorporated into the Province of Manitoba, but was part of the unorganized district of Saskatchewan under the direct jurisdiction of the Government of the Dominion of Canada. None of the ordinary means of modern transportation had approached the country, the nearest railroad was the Regina and Long Lake Branch of the C.P.R., now a branch of the C.N.R., to Prince Albert, and the nearest steamboat route was on Lake Winnipeg from Selkirk to Grand Rapids or Norway House.

From any of these places the country could be entered by canoes, as travel was confined to the many beautiful streams and lakes scattered through it.

In the prairie country to the south and south-west surveyors had been working for a number of years, and had made fairly accurate surveys on an extensive scale, but these surveys had not been extended into this country, and consequently there were no modern maps of the canoe routes that we were obliged to use through it. The only map that was serviceable was that made by David Thompson, one of the fur-traders of the old North-West Company, about 100 years before the date of my visit.

The district was one in which Indian hunters and fur-traders of the Hudson's Bay Company were still in undisputed possession. The positions of the trading posts, and the lengths and courses of the canoe routes between them, were known only to the traders themselves and to their Indian guides.

It must not be supposed that the advent of a Government exploring party, whose duty it was to survey the routes of travel throughout the country, to make and publish maps of all these routes, and to investigate and report on all natural resources, but more especially on the mineral and agricultural possibilities of wealth, would be hailed with any enthusiasm by fur-traders who had been so long in undisputed possession of the country that they had come to believe that they owned it. Most of them undoubtedly entertained the mistaken idea which until recently was shared by many men calling themselves educated throughout the Dominion, that the country would never support anything but fur-bearing animals and that the pelt of these animals was its only possible wealth. Nevertheless, these lonely traders were very human and received us with great kindness whenever we visited them.

Our party that Summer consisted of the writer and Roderick Thomas and John Harper, two men who had been with me through the Barren Lands in 1894, with a couple of local Indians on parts of the journey.

We travelled down Lake Winnipeg to Horse Island on the old steamer "City of Selkirk," whence the tug "Angler" took us to Eagle Island, and from there we went in our own canoe along the north side of Lake Winnipeg, and through Playgreen Lake to Norway House. From there, after exploring Wolf and Pine Rivers, we descended Nelson River to Cross Portage, which we had previously reached on our overland route from Fort Churchill to Winnipeg in December, 1894. From there we surveyed the streams and lakes westward as far as Nelson

House on Three Point Lake, where we had the pleasure of staying a little while with Mr. and Mrs. Stout, the Hudson's Bay Company's trader and his wife, and also with Mr. and Mrs. Gaudin, the Methodist Missionaries at the same place. From there we returned down Burntwood River and surveyed the route by Grass River and Cranberry Portage to Cumberland



On Lake Athapuskow, en Route to the Mines.

House, stopping for a little while with Mr. George Cowan, who was then building a house on Redd Lake.

While we were surveying the rivers we were also examining the rocks on their banks, and as a result of the examination we determined the existence of the belt of Greenstones mentioned above, which was then shown to extend from Wekusko Lake on the east, westward to Athapuskow Lake beyond. Incidentally we determined the existence of an extensive area of rich alluvial land in the valley of Grass River and its vicinity. It must not be considered, however, that the sceptics as to the prospective value of this Northern wilderness are all located outside of the Province of Manitoba, for when I stated that there was much good rich agricultural land in that northern part of the Province there was a chorus of protests against such "nonsense," as may be verified by reference to the Winnipeg papers of the Autumn of 1896.

Shortly after making the examination of that country I resigned from the service of the Dominion Government and begun private practice as a mining engineer, and it was not until the Autumn of 1916, twenty years after my previous visit, that I had the opportunity of re-visiting the country, in part in a commodious private car on the Hudson Bay Railway, and in part in canoes, as on the occasion of my previous visit.

The country is in much the same condition now as it was then, but there is now a thriving town on the bank of the Saskatchewan River at The Pas, where there was only a small but historic Indian Mission. A splendid modern steel bridge spans the river just opposite the town, and from it a new line of railway stretches off into the wilderness to the north, destined within a short time to bring this portion of the great inland Province of Manitoba to within a day's journey of the sea-coast. Deposits of minerals have been discovered by adventurous prospectors on the shores of some of the beautiful lakes that up to a year ago had never known a visitor other than the wild animals of the Canadian forests and the Indian hunters who followed them.

Through the kindness of the Honourable A. B. Hudson and Mr. J. A. Campbell, I was invited to join their party and go northward to the end of the track on the Hudson Bay Railroad, which was then 295 miles from The Pas. The weather was pleasant and the journey was particularly enjoyable, as it gave me an opportunity of seeing the country away from the streams and under quite different conditions from those under which I had seen it twenty

years before. For a hundred miles north of the Pas the country is almost level, and the soil is often quite thin, being underlain by flat-lying beds of limestone. Thence onward almost to the end of the track the land is generally rolling and sparsely wooded with spruce and poplar. The underlying rock is chiefly granite, but it is usually covered with a considerable thickness, perhaps thirty feet or more, of beautifully stratified clay which looks as if it would yield abundant crops to the farmer if it were properly cultivated. Very few cuttings on the railroad go down into the granite rock, but there are a number which show beautiful sections of this rich stratified soil.

Not many deposits of valuable minerals have been discovered along the line of the railroad itself, but Herb or Wekusko Lake is only 8 or 9 miles west of the railway, and is being connected with one of the stations by a good wagon road. On its shores a number of gold-bearing veins have already been found and are being actively developed. As the country is now definitely known to contain gold, search for rich veins will doubtless be continued more energetically as more prospectors learn to know the country.

After having spent four or five very delightful days along the line of this new railway, I turned westward and travelled up the Saskatchewan River to Cumberland House, from which place the new copper mines on Schist and Flin Flon Lakes were visited. Here again the miners have broken into the northern Canadian wilderness and have discovered rich bodies of ore which may be expected to yield more wealth to the country in a very few years than the fur has yielded ever since it was first visited by white men. The ore already discovered is situated about 100 miles from the railway and more or less remote from any regular line of transportation, but, nevertheless, it is not improbable that it may need to have a railway built to it for its own utilization, and it would be an interesting comment on the construction of the Hudson Bay Railway if it were found necessary to build branch lines from that railway to develop the local resources of the country before the main line itself should be completed.

The people of Canada have begun to realize that there is in Northern Manitoba a great country which is worth exploring and developing for the natural resources which it contains. The country is just at the dawn of its development, and in the next twenty years it will doubt-



On the New Road to Lake Athapapuskow.

less progress at a rate quite unknown in the past. If I should be alive twenty years hence and should have the good fortune to be able to revisit this country, which I have watched from its economic birth, I shall confidently expect to see in it towns and villages which will be centres of profitable mining industries, and also a prosperous farming community which will not only be raising a food supply adequate for the use of the country itself, but also for export to assist in feeding those who live in cities or districts less favorably situated.

July, 1917

Timber and Pulp Wood

Many years ago, the northern parts of Manitoba, as far north as what is known as the "Barren Lands," was thickly covered with a forest growth of spruce, tamarac, jack pine and other northern trees. Great areas of this was timber of merchantable size, and besides, there were immense stretches of valuable pulp wood, but during the last 25 or 50 years, millions of dollars' worth of this, one of our most valuable natural resources, have been destroyed by fire. In many parts of the burned area a new growth has sprung up, which is now well developed, and in the course of from 15 to 25 years, if properly protected, will be an exceedingly valuable asset. However, outside of the burned areas, there are still great stretches of valuable timber and pulp wood, which, taken in conjunction with means of transportation now available, and the prevalence of water power near them in almost every instance, form an exceedingly valuable resource, and one which should be protected, conserved and developed with the greatest care.

As yet no systematic investigation of the actual amount of timber and pulp wood available in Northern Manitoba appears to have been made. Information obtained in this respect is simply of an incidental nature, being found in reports of missionaries and explorers, and latterly from those engaged in the work of the Geological Survey Department, and in connection with surveys for the route of the Hudson Bay Railway.

Mr. J. B. Tyrrell has made frequent trips into the north country, and perhaps to him more than any other man is due our knowledge of this resource, as well as much other information regarding the country. From Mr. Tyrrell's reports, it is learned, a great deal of timber in the territory in question has been destroyed by fire. On Grass and Minago Rivers there is still some forest of excellent white spruce, but on the northern part of Burntwood River this is rather scarce. Black spruce and canoe birch grow on the more level and imperfectly drained areas. The aspen is the commonest deciduous tree, as it grows on the drier uplands everywhere, occasionally forming beautiful forests. "The



The Finger Saw-Mill at The Pas.

forests surrounding Reed Lake are mostly of poplar, but there are some good growths of fine large spruce, about 25 in. in diameter." On the south-eastern shore of Lake Athapuskow "considerable areas are covered with large white spruce." At Wintering Lake "the surrounding areas rise gently from the water, and are densely wooded with close forests of white spruce, growing on the rich clay soil. An old fur station near Setting Lake was found by Mr. Tyrrell, "considerably overgrown with large spruce trees, quite indistinguishable from those of the surrounding forest."

In an exploration trip, in connection with the Hudson Bay Railway, Mr. J. W. McLaggan covered the territory immediately north of The Pas, and the following information is obtained from his report: The first portion is covered with small mixed timber.



Sawmill of the Mandy Mining Co. on Schist Lake.

North of Cormorant Lake, there are from 5 to 5 million feet of good milling spruce, and a very considerable area of the same south of Reed Lake. North of Herb Lake are spruce and poplar, fit for railway ties and pulpwood. If fire had been kept out there would have been a big timber area in this district. Re-forestation is now being affected. Between Reed Lake and Elbor Lake he saw about 2 million feet of good spruce and poplar, averaging 12 to 14 inches in diameter.

In the report of W. Thibideau, on an exploratory survey of the ground between Fort Churchill and The Pas, in connection with the Hudson Bay route, is found the following:

"All the timber between the head of the Little Churchill River and Churchill is reserved for fuel purposes. The pulp wood belt, as estimated below, begins at Split Lake and extends to The Pas, 10 miles in width on each side of the way proposed for route of Hudson Bay Railway. On this area, assuming one-sixth to be covered by pulp wood, the balance being river, lakes, ponds, swamps, etc., and assuming 10 cords per acre, of an average of 6 inches in diameter, there would be 5,756,660 cords. This is a very low, but safe, estimate."

In 1910, Mr. J. R. Dickson, B.S.A., made an inspection of timber along the line of the proposed Hudson Bay Railway, from The Pas to Split Lake, for the Forestry Department. He covered a distance of some 235 miles along the line of railway. Mr. Dickson deplors the ravages made by fires in the past, but points out that a great deal of new growth will soon be suitable for pulpwood. He intimates that if general drainage conditions could in some way be improved so as to partially replace the black spruce with the white spruce, the wealth producing power of the region would be immeasurably greater.

Mr. J. A. J. McKenna concludes each section of his report on the Hudson Bay route with a recapitulation or summary, from which are taken the following:

"It would seem that after the Saskatchewan is spanned at The Pas, construction of a line of railway to Churchill would not be unusually difficult or expensive, and from reports it would appear there are in the intervening country stretches of fair timber

"The country about the Bay has only been glanced at by explorers . . . Merchantable timber has been seen, and vast stretches of pulpwood . . ."

It is therefore in order that some definite scheme should be evolved for systematically conserving and protecting this valuable resource, at the same time providing for its use in such a manner as to realize the utmost therefrom in the interests of the people. In the years to come there will doubtless be considerable settlement in the north, in and adjacent to the aforesaid areas. There will then be the additional menace of settlers' fires. It has been the experience of other Provinces that these have been responsible for the greatest devastation in forest areas, including the recent holocaust in Northern Ontario's clay belt. To control these immense fire possibilities, the Provinces of Nova Scotia, Quebec and British Columbia, have passed settlers' permit laws, providing that no fires may be set out by settlers during a "close season," except under permit from a provincial authority.

By the Fires Prevention Act, passed at the last session of the local Legislature, Manitoba has joined the ranks in this respect, and it is to be hoped that the authorities of the Department for the Prevention of Fires will co-operate in the taking of measures necessary and advisable for the protection of existing forests and the re-forestation of the burned areas.

May, 1917



Timber on Portage
Between
Lake Athapuskow
and Cranberry Lake
in the
Mineral Belt.

Water Powers in Northern Manitoba*

That Northern Manitoba has an immense asset in the numerous water powers within its boundaries, is now just beginning to be realized. Potentially these water powers are one of its greatest resources. It is hard at this stage to make comparisons, but from investigations that have already been made, it is a fair guess that the water power possibilities will take rank with the many other resources of this country, some idea of which is only really beginning to be grasped by the outside world.

The figures in this respect are stupendous, generally speaking, and it is hard to realize the immensity thereof. Further investigation will doubtless reveal other sources of power, but those which are now known are ample for the needs of many generations to come. In round figures the water powers of Northern Manitoba are as follows:

Saskatchewan River.....	100,000 horse-power*
Nelson River.....	2,500,000 horse-power
Churchill River—say.....	500,000 horse-power
Hayes, Burntwood, Grass and other rivers—say.....	400,000 horse-power
Total.....	3,500,000 horse-power

The Saskatchewan

The best known of the water powers of Manitoba, which has not yet been developed in any way, is Grand Rapids, near the mouth of the Saskatchewan River, where there is a head of 80 feet. The Saskatchewan drains an area of 150,000 square miles, its head waters being in the Rocky Mountains, the two main branches thereof uniting some distance below Prince Albert. In Manitoba, it flows through a district of swamps and marshes, the banks being usually low and not well defined, and there are a number of lakes of considerable size tributary thereto. Floods periodically occur, and on these occasions the waters spread over an immense area. This, from a water power standpoint, is not an unmixed evil, rather an advantage, the effect being to create a storage basin, and thus regulate the flow of the river to some extent, and it is in the lowest reaches of the river where the water powers occur. The waters of the Saskatchewan, after leaving Cedar Lake, enter Cross Lake by the Demicharge Rapids. Then there are Cross Lake, Red Rock and finally Grand Rapids just before Lake Winnipeg is reached. In the vicinity of Red Rock Rapids, the right bank is composed of limestone, some 6 feet in height. The left bank is of clay, about 12 feet high. The banks of the river gradually increase in height, reaching some 60 feet about midpoint of Grand Rapids, where there is a ridge of light-colored boulder clay, overlain with limestone. The channel narrows to about 500 feet, at a point in these rapids, spreading out again to nearly 3,000 feet before the lake is reached.

In the early days steamers ran regularly from Edmonton to a point just above Grand Rapids. From this point goods were trans-shipped over Hudson's Bay Company's tram line to Grand Rapids Settlement. This tram line is still in existence, and is now used to some extent by settlers in the district. At the present time the river is navigated by gasoline boats to the head of Demicharge Rapids, when canoes have to be taken for the rest of the journey.

Owing to the great difference in the periodical flow of this river, which divergence would be much greater were it not for the storage facilities above referred to, the power available varies materially at different seasons of the year. The following is an estimate based on 80 per cent efficiency, and is computed first for the estimated minimum flow of 5,000 second feet, and second for flow of 34,000 second feet, being the lowest monthly mean flow for the six highest months of the year, ending September 30th, 1913.

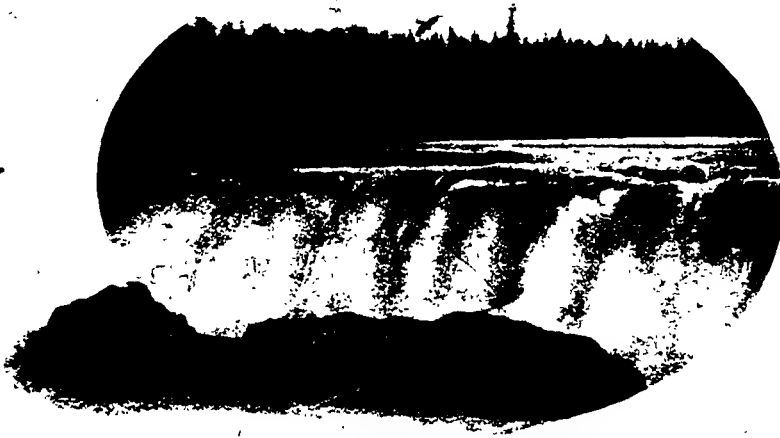
* Much of the data in this article has been obtained from reports of Commission of Conservation and of the Water Powers Branch, Department of Interior.

No estimate has been made as to the additional power available during periods of low flow through any storage system.

Possible Power Site	Head in Feet	Min. Flow 5,000 sec-ft. horse-power	Period 6 Mos. April Sept. 34,000 sec-ft. horse-power
Demicharge.....	15	6808	46289
Red Rock.....	15	6808	46289
Grand Rapids.....	80	36305	246877

Nelson River

The Nelson River is one of the greatest rivers of the world, and is unique in many respects. It drains an area of 450,000 square miles; it is 430 miles in length, in which distance there is a drop of 713 feet. The physical characteristics of the Nelson basin are exceptional; it shows a complete range of physical conditions. This is readily understood



Lynx Falls, on the Grass River, near Herb Lake.

when it is shown that the basin extends from the height of land near Lake Superior on the east, to the Rocky Mountains on the west, and on the other hand it reaches away south into Minnesota, and the waters gathered there are discharged into Hudson Bay. It is made up of basins great in themselves. The Saskatchewan has already been referred to, another is the Manitoba Lake system, with its tributary rivers, the most important feature thereof being Lake Winnipeg, fifth in size in North America. These lakes occupy a similar position as storage basins to that of the Great Lakes in the St. Lawrence system. It is on account of this that the range between flood and minimum discharge is never at any time very great.

The river in its upper reaches might more properly be described as being a chain of lakes, connected by falls or swifts and rapids. It expands into many lakes of slow running water, although the numerous islands divert the channel and result in sharply defined falls and rapids. In the upper stretch, between Lake Winnipeg and Split Lake, a distance of 250 miles, are many rapids, some of them being Ebb and Flow, White Mud Falls, Manitou, and lastly Grand Rapids. Below Split Lake, the river widens and is divided by islands, with the formations of Gull, Kettle and Long Spruce Rapids. From the last-mentioned to Hudson Bay, in which section the Limestone Rapids occur, the river is wider and freer of islands. At practically all rapids, rock outcrops occur. The soil overlying is principally clay, with a deposit in some places of gravel and boulders. In the upper por-

tions of the river, where there are rapids, the banks range from 10 to 70 feet. The period of high water is usually during the latter part of the Summer, but the extreme range between high and low water is never more than 6 feet. Steam boats navigate the river, from Warren's Landing on Lake Winnipeg, to Whiskey Jack Portage, and small gasoline boats and steam boats of the stern wheel type can navigate the river from its mouth, up a distance of about 55 or 60 miles, where the Lower Limestone Rapids are encountered. Various stretches in between are navigable, but for no extended length, owing to the prevalence of rapids.

The river might be divided into three sections, the first from the mouth to Kettle Rapids; second, Kettle Rapids to Split Lake, and third, above Split Lake.

The first section, namely, below Kettle Rapids, is generally very wide and free from islands where rapids occur. Rapids have a gradual descent and are quite long, and on account of the great width of the river, prospects for power development are not very attractive.

Long Spruce Rapids and Limestone Rapids are in this portion. The upper Long Spruce Rapid is "two miles long and has a descent of 40 feet. It comprises a series of cascades and rapids passing over granite, which shows throughout the breadth of the river. In the lower portion the pitches are quite appreciable and continuous, the high clay banks, however, have disappeared, and the river is less than one half mile wide. One of the stretches which is portaged, showed a descent of 25 feet in less than three quarters of a mile."

Of the rapids in the second portion, comprising Kettle, Gull and Overfall Rapids, the second pitch of the Kettle Rapids affords the greatest facilities for power development, on account of the narrowness of the river at this point. This is where it is crossed by the Hudson Bay Railway, and it is only about 200 yards wide. Above, the stream broadens to nearly three-eighths of a mile. The descent here is 21.5 feet in slightly more than one half mile. The banks 20 to 30 feet high, are of clay over granite, and afford excellent opportunities for development of power.

Above Split Lake the rapids and falls are well defined and there the descents are generally steep, as compared with those in the lower portion of the river. The Grand Rapids are a short distance from the Lake. The river here bends around a long, narrow point, across which is a portage. Across this portage it is only 160 yards, while the descent of the river around the point is 20.1 feet. The banks are granite, 20 feet high, and are not more than 400 feet apart. In the region including Spiwesk and Cross Lakes, the descent really occurs only at chutes and rapids, which are in channels separated by islands. This feature affords good opportunities for power development.

The Great Churchill

The Churchill River consists mainly of a series of irregular lakes, with low, thickly wooded banks, connected by falls and stretches of rapids, or swift reaches of river. From the source of the Beaver River, its farthest tributary to the Hudson Bay, is a distance of 1,200 miles. The Churchill, roughly speaking, runs parallel to the Nelson, and drains an area of 114,000 square miles. On this river, immediately north of The Pas, is Pukkatawagan, the headquarters of the trade of the district. In this part of the river there are a number of rapids. Between Pukkatawagan and Southern Indian Lake is Granville Fall, just above Granville Lake, which has a nearly vertical descent of 25 feet. For 23 miles above the mouth of the Little Churchill, the average width of the Churchill is approximately one-third mile. High clay banks occur alternately on each side, and numerous rapids exist in this section, the fall being about 170 feet, or an average of $7\frac{1}{2}$ feet per mile. The total descent in the river, from the confluence of the Little Churchill to the sea, is approximately 400 feet, an average of more than 4 feet per mile.

Reports regarding this river are not as definite as in connection with the others already referred to, but it is safe to estimate that the available power within the Province of Manitoba is over 500,000 h.p. In all probability further investigation will show figures to be greatly in excess of this.

It would extend the scope of this article too long to go into detail regarding water powers in other rivers in Northern Manitoba. While not in the same class as the Nelson

there are many rapids of importance for power development on the Hayes River, which is approximately parallel to the Nelson, from Lake Winnipeg to Hudson Bay. Considerable water powers exist in the Burntwood and Grass Rivers, also at other points in the series or chain of lakes and rivers stretching across the mineral belt in the country north of The Pas.

Available for Many Uses

An important feature about the water powers of Northern Manitoba is that they are not only extensive, but widely distributed. The Hudson Bay Railway almost parallels



Rapids on the Sturgeonweir River, Sask., near the Flin Flon Mines.

the Nelson River, the immense timber and pulp areas of the north have in many instances water powers within easy reach, and this source of power is available for development of much of the mineral wealth of the country.

There is now under way a scheme for the utilization of the water power of Grand Rapids on the Saskatchewan and the pulp limits in that vicinity. Messrs. D. B. McDonnell, of Winnipeg, and A. W. Fraser, of Ottawa, with their associates, have secured certain concessions from the Dominion Government in connection therewith. They have plans for power development fully completed; have arranged for sufficient money for preliminary operations, and propose to get the work under way this year. Large pulp areas along Cedar Lake are controlled by this syndicate. Plans for the construction of the power dam contain provision for its use as a railway bridge, for extension of the railway now terminating at Gypsumville, only about 115 miles away. Competent engineers attest to the soundness of the scheme, which outside of the manufacture of pulp into paper and other products, has additional possibilities. Power generated from this source can be transmitted to The Pas, and from there to the different mining camps north of that town.

On the Churchill River, near the western boundary of Manitoba, are several rapids which, according to reports of Government engineers, are capable of developing 50,000 horse power. These are only about 80 miles north of Flin Flon Lake, and the mines in that district and undoubtedly further, mineral deposits will be discovered at a much shorter range. It is only necessary to have this information to appreciate the possibilities that here exist.

Hudson Bay Railway

Another feature worthy of note is the close relationship between the Hudson Bay Railway and the Nelson River; at no point for 300 miles are they very far apart. The railway crosses the river twice, at Manitou Rapids and Kettle Rapids, which places offer good facilities for development of power. It is confidently predicted that before many years the railway will need a double track. To warrant a betterment of this nature traffic

would have to be such as would also justify, in fact demand, the electrification of the road, thereby materially reducing the cost of operation, and thus further assuring the success of the enterprise.

Production of Nitrates

There is a scientific use to which the water powers of Northern Manitoba may be put in the not too remote future, and to which their location and character seem to particularly adapt them, that is, in the production of nitrogen, nitric acid and nitrates. This important feature is referred to in the last report of the Commission of Conservation as follows:

"The nitrogen which is required to re-invigorate exhausted soils, exists in unlimited quantities in the atmosphere. The use of water-power on a huge scale is the principal economic method of extracting this nitrogen from the atmosphere, and rendering it available for practical use. No country in the world is so richly endowed with water power as Canada, and many of the greatest of our powers lie so remote from large centres of population that they fairly radiate the suggestion of adaptation to the necessities of such industries."

Mr. P. H. Mitchell, in his admirable monograph on the water powers of the Prairie Provinces, published under the direction of the Department of Interior, amplifies this idea:

"Nitrogen is the greatest essential in the replenishing of soil; the atmosphere contains an unlimited supply, three quarters of the weight of the air being nitrogen, but not in a form available for the soil. Above each square mile of land it is estimated there are 20,000, 000 tons of nitrogen. As a result of electric action in the air, about 100,000,000 tons of combined nitrogen are restored annually by nature to the soil of our planet, present in the form of nitric acid and nitrates in descending rain. By properly applied electrical discharges in the presence of air, this process can be duplicated and nitric acid and nitrates produced in commercial form. The locality of the manufacture of such a necessary commodity is, from the standpoint of transportation, nearest to the point of use, the distribution is universal; in the Prairie Provinces the proximity of the great water powers adjacent to this coming market is most notable.

The 200,000,000 acres of arable land within the Provinces, when all placed under cultivation, will possibly consume on an average more than 100 pounds of nitrates to the



Down the Nelson River, en route to Port Nelson.

acre, when intensive fertilization is resorted to. Today, the efficiency of electrical production of nitrates is low, but possibly five tons per horse power year would be beyond the highest efficiency to be obtained in the future. The power required to meet such a yearly demand would have to be two million horse power. The figures are staggering, but with time as an element, and with Canadian wheat as a staple, in an ever widening market, such conditions must come to pass."

May, 1917.

The Fur Trade

In the good old days of fur trading the country of which The Pas is the centre was known to the fur traders as the "muskrat" country, and is of particular historical and economic interest. It was, and is, one of the richest fur producing districts on the continent, and at the time of the rivalry between the Hudson Bay Company and Northwest-Company was the chief battle ground between the traders of these companies. It was first occupied by representatives of the latter company, who reached it from Montreal. Subsequently the former company sent their traders right into the district from Port Nelson in order to partake of the immense profits resulting from the trade therein.

As nearly as can be estimated by careful enquiry from various sources of information, the value of the furs which passed through The Pas during the last season and for which this town was the market approximated a quarter of a million dollars. This would take in all the region north and west of the Hudson Bay railway, and to some extent south and east thereof, but would not include Norway House district and territory lying north and east, stretching towards Hudson Bay, in which also a very considerable fur trade is carried on.

This is an important industry and with careful supervision will not only continue but might materially increase as years go by. The Hudson Bay railway affords facilities for



"The Fort"—Norway House, a Famous Old Hudson Bay Trading Post

bringing in the season's catch hitherto not enjoyed and trappers are therefore penetrating more remote regions than formerly. There is no reason why districts back from the railway should not continue to produce this valuable commodity in increasing quantities. In the greater part of the north country fur for many years to come will remain the chief source of revenue.



Caribou on the Shore of Carey Lake in the Far North.

(Photo by J. B. Tyrrel, Geological Survey Expedition, 1893)



A Log Fishing Cabin on Reed Lake

Fisheries

The vast number of lakes, large and small, to which some reference has been made elsewhere in this publication, and which are very considerable and important features in the topography of the north are, according to reports, usually all well stocked with fish. The rivers also, especially the Saskatchewan, are noted in this respect. Sturgeon, white fish, pike, different kinds of trout, and various other kinds of fish are found throughout these lakes and rivers in abundance. Besides, in the smaller lakes and streams are found speckled trout, bass, and other varieties so much desired by the angler. These resources have hardly been touched as yet, although over 50 cars of fish were shipped out of The Pas last season, and this output will be doubled, perhaps trebled, during winter season, 1917-18. This year commercial fishing is being done on Lake Athapapuskow for the first time. Ten licenses have been issued and the catch is limited to 100 tons, and on several other lakes commercial fishing is also being carried on. Certain of the lakes also seem particularly adapted for the production of other kinds of fish than are now found therein, and in the near future the establishment of a fish hatchery at a convenient and suitable spot would be of a great advantage to this industry. As means of transportation increase, fishing is bound to become one of the important industries of New Manitoba.



The School follows Settlement, even in the North.

Agricultural Possibilities of Northern Manitoba

There can be no doubt that the impression has been prevalent in Old Manitoba, and in fact throughout Canada, that whatever resources may be in New Manitoba are confined to mineral, fur, fish and timber, and that agricultural lands do not figure in the list at all. The popular belief appears to be that the country is simply a waste of lakes, rivers, rock and muskeg. It is probable that the old fur traders have had much to do with this, as it undoubtedly was not the desire of the fur companies to have it known that any opportunities for settlement existed in the north land. Indeed it is a matter of record that for many decades they denied the possibility of agricultural development in the great plains of the West, which are today in many respects the richest grain country in the world.

Coming to more recent times, there is a considerable volume of evidence as to the agricultural possibilities of this north land.

Rev. John Semmens, who is well known in Winnipeg, spent several years as missionary



Portage Around Long Spruce Rapids on the Nelson River

in the north. He lived for two years at Nelson House in the early 70's, and as he travelled frequently between that point and Norway House, and covered the surrounding country pretty thoroughly, he is in a position to speak authoritatively regarding the district. He says: "There are found large areas of open country and valleys of tributary rivers, where the soil is rich and deep and there grazing and stock raising could be very successfully carried on. The sheltering forests and the abundant water sources and numerous beaver dams, and the rich native grasses, would indeed make this locality ideal to sheep raisers and general ranchmen. The absence of anything like a market has hitherto kept this country from being reported of, but if a railway becomes an actual fact, Manitoba will add very much to her available resources when extension comes, and settlers will find that in soil, in wood, in grasses and in waters, this unknown land will afford comfortable homes for thousands.

"The cold at Nelson House is no more intense than of a Winter in northern Manitoba, as at present constituted. The presence of so much water so regulates the temperature that there are few frosts either early or late to make growth uncertain."

Rev. John McDougall is another pioneer missionary who has lived and worked in the north country. He has this to say: "The Summer begins early, and growth and vegetation are almost of a tropical character. This is attributable to the long hours of sunshine

that prevail, and to the proximity of streams of living water everywhere in the district, each of which is conducive to plant nourishment. There are countless acres of good land, which can be made to yield fruitful returns to the farmer. The district in which is situated Norway House, Cross Lake, Oxford House, Island Lake, Nelson House and Split Lake, covers a wide area, and at each of these places garden vegetables, and grain for personal requirements have been successfully grown for a term of years. Summer frosts are practically unknown, and the germination of vegetation owing to the long hours of sunshine is exceedingly rapid."

There have been many other travellers and investigators, such as Dr. Robert Bell, Mr. Fawcett, Mr. A. P. Low, Mr. Wm. McInnes and others, whose testimony in a general way is similar.

Mr. J. B. Tyrrell, who has spent many years in the North Land in exploration and scientific research, states: "From the Nelson River westward to longitude 100 degrees 30 minutes, and from the north end of Lake Winnipeg northward to beyond latitude 56 degrees, the country



A Settler's Cabin and Clearing Near The Pas

is generally covered with a coating of stratified clay, varying in thickness from a few feet up to 50, 60 or even 100 feet. This clay is of much the same character as that of Red River Valley, having been, like it, deposited in the bed of the old post-glacial lake that once occupied the basin of Lake Winnipeg. The rivers have, as a rule, cut down through this clay to the underlying rock, but away from the water-stretches rock exposures are not of any frequent occurrence. The soil is rich and fertile, and the country will doubtless produce in abundance all the hardier roots and cereals grown in the Province of Manitoba, and cattle, sheep and horses could be successfully raised. If the country were made accessible by a railway passing through it to Hudson's Bay, it would certainly support a considerable agricultural population.

"At Nelson House, in the extreme northern part of the district explored, many of the Indians regularly grow potatoes. It is probable that the hardier varieties of grain would also ripen here, but at present there is no object in growing grain of any kind, for it could not be readily utilized. Wheat ripens well at Norway House and Cross Lake, on the Nelson. During the Summer of 1896 no frost occurred until August 29th. At Nelson House we were informed that during the preceding seven years at least, no frost that would injure garden produce had occurred at an earlier date.

"Of course the sunlight has a great effect on the growth, and where days have 18 hours sunlight, plants grow faster than where the day has only 14 hours sun."

Mr. J. R. Dickson, B.A., M.S.F., assistant inspector, Dominion Forest Reserves, in 1910 made an exploration trip of some 235 miles along the waterways in the neighborhood of the then proposed line of the Hudson's Bay Railway. The district travelled by him

is now closely tributary to the constructed line. Mr. Dickson reports: "That from 50 to 75 per cent thereof is arable land, and probably has a good agricultural future." And further, "I estimate the area of that portion included from north to south, between Wintering and Cross Lakes, and from east to west, between Setting and Sipiweesk Lakes, at 2,000 sq. miles. The soil is exactly similar to that around Cochrane, in new Ontario, which yields such large returns under right treatment. On well drained spots, as far north as Split Lake, the flora is almost identical with that of similar sites in Riding Mountains of Manitoba, proving that during the growing season these localities lie under one and the same isotherm, or nearly so. And yet Riding Mountains are nearly 400 miles south-west of Split Lake. Two other factors which help vegetation in this northern clay belt are the low absolute elevation—only 500 to 700 feet, and the large proportion of sunlight during the growing season.

"At Cross Lake no damaging frosts occurred between June 8th and September 11th, an interval of 93 days."

And in concluding his report he remarks: "I would respectfully point out the advisability of the Dominion Government placing several small experimental farms at suitable points within the limits of this clay belt, to make careful test of its seasonal variations and cropping possibilities. When the railway is completed such information will be of the utmost value to intending settlers. The Winters are quite as enjoyable as in Manitoba, probably more so."

Mr. R. H. Campbell, Director of Forestry of the Forestry Branch, Department of the Interior of Canada, in an address delivered before the Canadian Forestry Association at Winnipeg in 1913, said:

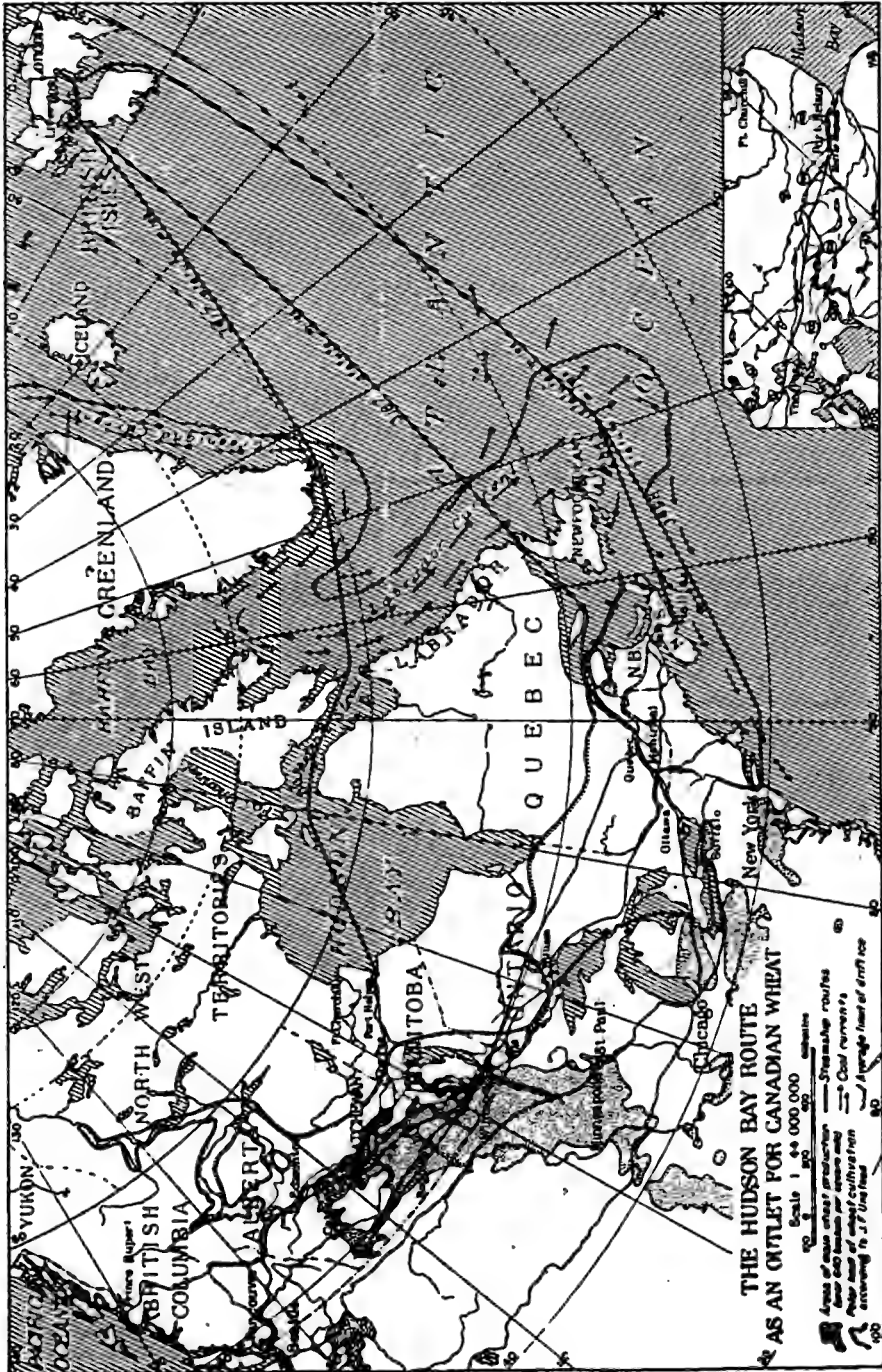
"In northern Manitoba, an area approximating three to four million acres on the Saskatchewan River might by drainage works be made of agricultural value. At present lake and muskeg cover most of this area.

Mr. T. H. P. Lamb, who has been a resident of Moose Lake for over 20 years, gives emphatic testimony to the adaptability of the country to the above uses. He has now 25 head of cattle and is arranging to bring in another car load at an early date, and Mr. St. Godard, also a resident of the Moose Lake district, has 40 cattle. The halfbreeds there have cattle also. They are all doing well. Mr. Lamb mentioned particularly a two-year-old steer which he drove into The Pas in March last and it there tipped the scale at 1,224 lbs. It was rolling fat, notwithstanding the fact that it had been out in the open all the time since it was a small calf. In his district, especially along some of the streams, are miles of alluvial soil, on which there grows the best kind of grass for food purposes. Vegetables are the class referred to by Mr. McInnes in his geological report 1906 wherein he mentions potatoes grown 50 miles north of The Pas. "They were quite showy potatoes, great large fellows, like those you see exhibited at fairs, and tremendously large, grown on practically new land, and they had a very large crop of them."

Immediately tributary to the H.B. railway for 100 miles northeast from Mile 137 there are one hundred thousand acres of good land awaiting development. For the productions of this land there is bound to be in the future a big local market, in the mining camps, railway construction and development and terminal works.

Up to the present of course these lands have hardly been thought of as a commercial proposition. The situation has, however, changed. Mr. John Armstrong in his report of his preliminary survey for the Hudson Bay Railway mentions: "It may be remarkable, however, that although these lands may require more or less improvement in the way of clearing and drainage the fact that they are situate within a few hours' run to an ocean port may give them a value not hitherto thought of and may cause a more rapid settlement than expected."

January, 1917.

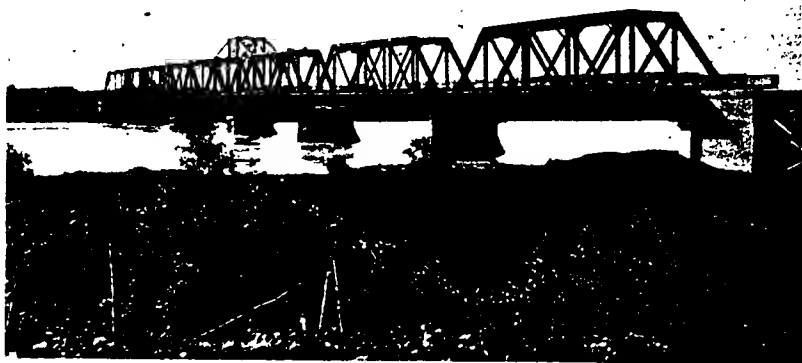


The Hudson Bay Route

By John A. Cormie, The Pas, Man.

(Reprinted from the "Geographical Review, for July, 1917, by permission of the American Geographical Society of New York, Broadway, at 156th Street)

Although the Dominion of Canada is at war and has undertaken to send overseas five hundred thousand soldiers, over four hundred thousand of whom are already in uniform, and although she has manufactured vast quantities of munitions of war and has raised several hundred millions of dollars for the prosecution of the conflict, she has at the same time continued to work on a project which has great historical interest and which promises to be an important factor in the future development of the country. No more romantic undertaking can be found in the history of North America than the long and fruitless search for the North-West Passage, a search which lured Henry Hudson from Europe for four summers in succession in the early years of the seventeenth century. After he had failed twice, his third attempt brought him to the mouth of the great river which bears his name, and the fourth carried him through the strait which posterity has called for him, out into the sea which Earl Grey called the Mediterranean of Canada and which may become the Baltic of North America. After sailing almost due south along the east



The Hudson Bay Railway Bridge Over the Saskatchewan at The Pas

shore of the bay, instead of the warm waters of the Pacific he found the marshes of James Bay, where a mutinous crew, having no vision of a new track for the world's commerce, turned him adrift in an open shallop and left him to his fate. The Gentlemen Adventurers of the Hudson's Bay Company, half a century later, followed Hudson's trail through the strait and set up their trading posts in a huge wilderness, which in these days is becoming an empire. Today the people of Canada are building the Hudson Bay Railway, a line over four hundred miles long, from The Pas, an ancient Hudson's Bay Company trading post on the Saskatchewan River, at the edge of the wheat fields of Saskatchewan and Alberta, to Port Nelson on the bay.

The first European colony in western Canada, sent out by Lord Selkirk slightly over one hundred years ago to found the Selkirk settlement on the banks of the Red River near where the City of Winnipeg now stands, sailed through Hudson Strait and Bay; and there is a well-defined opinion that the products of the western farms should follow the path of the first settlers and reach the European market by the short northern route. The steel of the new line is at the time of writing within ninety miles of the port. The present summer will be occupied with the building of a large steel bridge over the Nelson River,

at Kettle Rapids, and were it not for the difficulty in securing both men and supplies, trains would be running to tidewater before the end of the current year and the dream of a generation of western farmers would be realized.

When we take into account the toll which the long rail haul to the seaboard at Montreal or New York has levied on the grain growers of the West, we need not be surprised at the steady demand for the new route, which is shorter by one thousand miles than that by Montreal. It has been realized that Port Nelson is practically the same distance from Liverpool as is Montreal, and that a car of wheat on its way to Europe from Regina could be at the port by the time it would have reached Fort William by the other system. Thus the saving is the thousand miles between Fort William and Montreal by rail or the very much longer distance and the double handling of the lake route. From central Saskatchewan and northern Alberta and the new settlements which will undoubtedly be formed still farther north, as for instance, the Peace River settlements which are already begun, the saving in mileage will be much greater. A glance at the map will show that the benefits which will accrue to the farmers of Western Canada with the development of this short road to Europe will be enjoyed by their neighbors in the Western States. The grain country tributary to the Great Northern Railway is several hundred miles nearer Europe by way of Port Nelson than by way of New York.

If one of the results of the war should be the realization of the expectations held by many public men of the Dominion, there will be a very large and rapid increase in the population of the prairie provinces. Principal Oliver, a widely known educator of Saskatchewan, said in a recently published address, "Europe with her war debts, with crippled and disorganized industries, will not be the Europe that but yesterday flaunted the glories of its riches in the face of the whole world. If we had a flood of immigration when Clifford Sifton opened the sluice gates, now will come an avalanche." Lord Shaughnessy, of the Canadian Pacific Railway, has recently given his opinion that, though "bleeding with sacrifice and bending with every effort on behalf of the great Empire of which she is an integral part, Canada's biggest role in the play of nations is not now but in the future. Its population is not a fraction of what it should be, of what it is capable of becoming, and of what it will be after the war." Ex-President Taft's remark that "the country is still hardly scratched" is particularly true of the area lying immediately tributary to the Hudson Bay Railway. With the coming of more people, there will be, of course, greatly increased production.

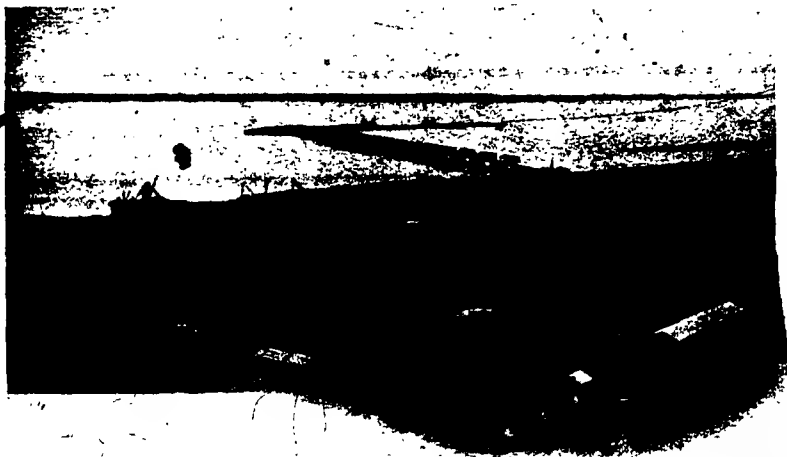
Necessity for Hudson Bay Route

The congestion in the grain elevators and on the railroads ever since the fall of 1915, when Western Canada produced the record crop of over three hundred million bushels of wheat, is another condition that must be taken into account in connection with the Hudson Bay route project. With increased population and enlarged crop acreage, the record of 1915 will before many years be far below the average annual yield. The farmers of the West, to use their own phrase, are "getting into cattle." Mixed farming with rotation of crops is now a necessity in the older districts. The northern sections of the provinces, with their greater yields of natural hay and the protection afforded by larger forest areas, together with the fact that a short haul of two or three days will bring cattle to tidewater, will more quickly develop mixed farming.

The cost of transporting farm products is now so great that it is declared by agricultural authorities to be the chief cause of the relatively low returns to the industry. This disadvantage increases as settlement proceeds farther north and west. It burns the farmer's candle at both ends, giving him lower prices for his products and increasing the cost of all the commodities he purchases.

These three considerations, the reduction of one thousand miles of rail haul in the distance that now separates the granaries of the West from the Liverpool warehouses, with consequent lowering of the cost of transportation both ways, the prospect of large and rapid expansion in volume of production, and the demands made upon the railway facilities by the present agricultural output, make out the case for the Hudson Bay route, provided there be no insuperable obstacles to its construction and operation.

That there have been, and are, obstacles in the way of the project is beyond question, but it appears to be equally beyond doubt that they are not insuperable. Perhaps the chief hindrance to the advancement of the work in the past has been the attitude of the great trading companies, notably of the Hudson's Bay Company, to which was given in 1670, by King Charles of England, a monopoly in trade for all future time over all the north-western part of North America, and whose interest it was to preserve their trading and trapping grounds from the incoming of the white settler. A thick cloud of darkness was accordingly spread over all their territory. This was broken first in Oregon, and the operations of the Adventurers of England have been gradually forced back by incoming settlement, until now the only territory left lies north of the Saskatchewan River. Reputed inhospitable climate and alleged barren soil have been urged as an objection to permanent settlement in districts where today there are thriving communities. Investigation has disclosed the fact that the climate of Manitoba, four hundred miles north of the international boundary, on account of the absence of windswept plains, and because of the



General View of Port Nelson showing Bridge to "Island" where ships will load.

proximity to the waters of Hudson Bay, the temperature of which is slightly higher than that of Lake Superior, is more endurable than that of Winnipeg. Cultivated strawberries have been matured in The Pas, the southern terminus of the road, and all ordinary vegetables are grown with success at points along the line as far as Port Nelson. Happily the plains of Western Canada are now known to be fit habitation for others than Indians and buffaloes, and, in time, the darkness will lift from the great areas north of the prairies.

A second difficulty encountered in building the road was the absence of authoritative maps of the district through which the road was to be built. Apart from a knowledge of the general courses of the Churchill, Nelson, and other larger rivers, there was no reliable information, and knowledge of the details of these river courses was vague. Along the line there are many lakes, but nothing was known of most of them until the surveyors went in to locate the railway, and knowledge of the general topography of the country was in an equally vague state. While the preliminary survey of the railway was difficult and costly, valuable additions have been made to our geographical knowledge of the Dominion.

Some of the Difficulties

The lack of settlements along the proposed line was a further difficulty. Apart from groups of Indians, widely separated, with an occasional trading post and mission, there was

no settlement and no mode of access but the canoe in Summer and the dog train in Winter. The railway builders had to pierce this unsettled land, carrying along with their building material, all supplies of food and fodder for an army of workmen and their animals. The road could not be built in sections, as was done with the recently built National Trans-continental Railway of Canada. It had to be pushed out mile upon mile from the south.

Perhaps the greatest of all the difficulties that lay in the path of the enterprise was the antagonism of influential Eastern interests, who have the ear of both political parties, and have used their influence to prevent the beginning of the work, and are today attempting to delay construction, some, indeed, advocating the entire abandonment of the project. A Toronto weekly, with a considerable circulation, remarked, when the call came for railway iron for the battlefields, that the Hudson Bay Railway might now justify its existence by tearing up its steel and shipping it to France. Some months ago the *Toronto Globe* said: "The opinion among competent judges is that the Hudson Bay Railway is the biggest sinkhole into which the money of the people of Canada has ever been put." This reminds one that the late Alexander Mackenzie objected to the building of the Can-



The Bridge at Port Nelson.

adian Pacific Railway on the ground that it would not pay for its axle grease. Happily for the Hudson Bay Railway, as well as for some other matters, the people of the West have reached a point of political influence where they can no longer be ignored, and opposition in other parts of the country cannot prevent the route from being put into operation. The *Manitoba Free Press* replied to the *Globe* by saying: "Malevolent Eastern interests may delay but they cannot defeat this great national project, designed to free, to some extent, the Western wealth producer from his Eastern financial master."

The building of a harbor at the mouth of the Nelson River has not been easy. The drainage basin of the Nelson includes all of the Canadian prairies, the Red River valley in the United States, and Ontario up to a point seventy miles west of Fort William. This means that the Nelson is a very large river. It carries down great quantities of silt, which are deposited at the mouth of the channel, creating extensive sand bars and an unstable river bottom which will require constant dredging.

An island is being built near the mouth of the Nelson which is reached by a steel bridge, and, while engineering mistakes appear to have been made, it is authoritatively stated that the most difficult work is done, and the building of a substantial dock is now only a matter of time.

The Question of Navigation

Is Hudson Strait navigable? A railway can be built from the wheatfields to the bay, the mouth of the Nelson can be provided with dockage facilities for large ocean boats, but can the strait be navigated for a period each year sufficiently long to justify the attempt to operate the northern route? On the answer to that question hinges the whole

problem. Hudson Strait is a body of water about four hundred and fifty miles long, in width varying from fifty miles to two hundred miles, through which the ice-drifts from Fox Channel pass out into the Atlantic. Through this strait all traffic to and from Port Nelson must pass, and, although the port is six hundred miles from the western end of the channel, its importance as a sea port is absolutely determined by the length of time each year navigation can be safely carried on through the strait.

That the strait is navigable no one disputes. Who penetrated it first is not known, but it is known that Henry Hudson, with a poor little tub of a boat and a mutinous crew, sailed into the bay on August 4, 1610, and that the crew, after casting their master adrift the next Summer, went out through the strait and reached home that same year. The following year Admiral Button was sent out by the British Government to search for the lost adventurer. He reached the Nelson River, wintered there, named the port after his first mate, who died during the Winter, and returned to England in 1613, to report finding no trace of Hudson. In 1615 William Baffin, whose name lives in Baffin Island, penetrated the strait and was in the open water of the bay on July 3. The Hudson's Bay Company boats have used this northern route to reach their fur posts for two centuries. If these early navigators, in an unknown sea, with all the handicaps of little sailing vessels, could safely sail these northern waters, what may not be done with charts, lights, the extension of the wireless system from Port Nelson, a flotilla of ice-breakers, and modern steam-driven and steel-clad boats? In 1915 thirty-six passages are known to have been made without mishap.

In regard to the length of time during each Summer that navigation is possible, the opponents and friends of the project must content themselves with opinions. There is general agreement that for four months of the year, including August, September and October, with parts of July and November, the strait can be safely sailed. The late Admiral Markham, who, with Commander Gordon, in 1886, made an investigation, the report of which has never been superseded, said: "It is almost impossible, until more is known of the movements of the ice in the strait, to allot any fixed period. From the general information I have acquired from various sources more or less trustworthy, combined with my own experience, I am prone to believe that Hudson's Strait would be found navigable for at least four months every year, and probably often for five or six months. There will, I have no doubt, be many years when navigation can be carried on safely and surely from the first of June to the end of November." In 1907 an investigation was made by a select committee of the Senate of Canada, on "the navigability of Hudson Bay and Hudson Strait, as an alternative means of communication with the north-western regions of Canada," since published in a report entitled "Canada's Fertile Northland," and evidence was taken from men competent to express opinions on the subject. Mr. A. P. Low, the then Director of the Geological Survey of Canada, said: "The strait is navigable from about the middle of July until the first day of November anyway, and a couple of weeks might be added at the end, because the ice in Hudson Bay, the new ice, is of no consequence to a ship until it gets to be 15 or 18 inches thick, and not much ice forms before that date." Altogether, Mr. Low considered the Hudson Bay route, when it was clear, an even clearer one than the St. Lawrence. There are at least two months when there is no trouble from ice at all. Dr. Robert Bell, of the Geological Survey, also appeared before the select committee and said that all his trips through the strait were between June 22 and about October 10, and he expressed the opinion that the strait is navigable between these two dates. Dr. Bell said he "did not know any more desirable piece of navigation in the world, excepting the middle of the ocean, and even then a common sailor, who could not take an astronomical observation, could sail through the straits with perfect safety. That was what Henry Hudson's men did after putting him and part of the crew into an open boat and leaving them behind." He was further of the opinion that ocean-going vessels would be suitable for navigation in Hudson Bay and Strait, but in the Winter it might be all the better if the ships were protected. Similar testimony in very imposing volume, some more favorable, some less so, is available. The success of Canadian ice-breakers at Archangel has helped to increase confidence in this northern route.

In estimating the value of this new line of communication, it must be borne in mind

that, even at the present rate of production, the crop is never out of the country the year it is harvested. Mr. Gutelius, the superintendent of the Canadian Government Railways, estimated that it would take the railways two hundred days to move the crop of 1915. This estimate was unduly optimistic, for part of the 1915 crop was still in the country when the 1916 crop began to come upon the market. With so short a crop as that of 1916, it was estimated that on April 5, 1917, there were still approximately 25,000,000 bushels of wheat in the Province of Alberta, 35,000,000 bushels in Saskatchewan, and 12,000,000 bushels in Manitoba. This grain will still be moving East at the time the Hudson Bay Railway opens. Abnormal shipping conditions created by the war must be taken into account, but, as population increases, a smaller proportion of every crop will be shipped out the year of its production. Taking the three Western Provinces, a comparison of the yearly production of wheat and oats in bushels is shown by means of the accompanying table, published in the *Bankers Magazine* (New York):

	Wheat	Oats		Wheat	Oats
1907.....	70,922,584	74,513,000	1912.....	196,000,000	224,500,000
1908.....	96,863,689	108,987,000	1913.....	188,878,000	208,308,000
1909.....	119,200,000	163,998,000	1914.....	124,445,000	150,474,000
1910.....	101,236,000	108,301,000	1915.....	370,000,000	305,680,000
1911.....	169,725,000	185,570,000	1916.....	160,000,000	232,409,000

Consideration must also be given to the fact that the country buys as well as sells, and that the payment of the heavy cost of rail haul to the stations on the prairies is made by the purchaser. If farm products can be shipped out via Port Nelson and the strait, commodities can be brought in over the same route—must, indeed, be brought in if the project is to be a commercial success. Coal, for instance, as any one living in the north-west knows, is an important part of the necessities of life. Mr. M. J. Butler, formerly chief engineer of the Department of Railways and Canals of the Dominion Government, said, in his report on this route: "I believe it is practical to lay down coal at Port Nelson from Nova Scotia at a cost not exceeding \$3.75 per ton. The rail haul to Saskatoon, as an average point of distribution, need not exceed \$4.00 per ton, making the cost \$7.75 per ton."

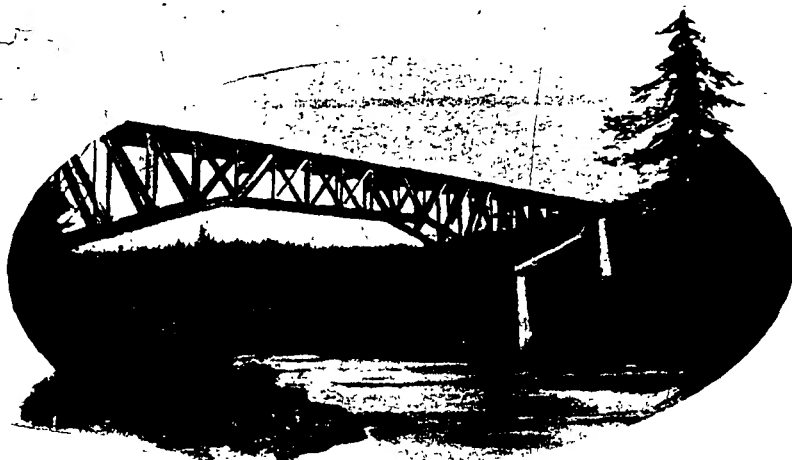
Resources of the Country

What of the country through which the road is being built? Is there a future for New Manitoba which would justify the construction of this line, apart from overseas shipping?

The oldest industry, is of course, that of the trapper. An army of trappers bring into The Pas, the commercial centre of the district, an annual catch of fine fur to the value of \$250,000. The manager of the Hudson's Bay Company post at this point in the days before the railway brought competition, has bought as many as 250,000 musk-rat pelts. All the fine furs, beaver, otter, mink, silver, black, red, and white foxes, are taken in large quantities, and at least two men have begun the industry of breeding silver foxes. The fishing industry, carried on during the winter, has reached considerable dimensions, the catch, consisting of whitefish, lake trout, and pickerel, for the season amounting now to about one thousand tons. Permission was given in 1916 to take sturgeon from the lakes. Owing probably to the clear, cold water of the northern lakes, these fish are not excelled. Considerable areas are covered with spruce, and a beginning of the lumber industry has been made by the Finger Lumber Company, which has established a plant at an outlay of one million dollars, with a daily cut of 200,000 feet of lumber. The amount of pulpwood has not been estimated, but there are apparently vast quantities of such wood. During the past year much attention has been paid to the discovery of mineral-bearing rocks in the western flange of the "Great Canadian Shield" over which the railway runs. In northern Manitoba these rocks cover an area approximately 140 miles in length and 25 miles in width. Near Mile 82 on the railway gold has been discovered, and mining operations have been begun on three claims. The ore is gold-bearing quartz, and the first car recently shipped out, which was in the nature of a test, was treated in Trail, British Columbia, and the returns are said to be satisfactory. Farther east than the goldfields, at a

point almost on the boundary between Manitoba and Saskatchewan, copper ore has been discovered in two bodies, one of which is very large. Operations have been begun on the smaller of these bodies, and during the past winter 3,600 tons of ore have been taken out. This ore contains 22 per cent of copper, and there are also iron and some zinc. On the larger of these bodies of copper ore the work of drilling, with a view to determining its size, has been carried on for several months. It is not possible to say more about the mineral outlook of the country, for the reason that there has been little prospecting, but the rocks are of the same geological age as those at Cobalt and Sudbury in Ontario, and mining engineers have said that the future of the mining industry of New Manitoba is very bright indeed. Power from many rapids and waterfalls may play a large part in the development of this industry.

Is there an agricultural future for the district? For the first ninety miles of the railway line, the country is low and swampy and covered with moss. Under the moss is heavy clay, carrying many glacial boulders. Nothing can be done with this land until it is drained, and it is doubtful if much of it can be drained. For fifty or sixty miles farther the country



The Hudson Bay Railway Bridge Over the Nelson at Manitou Rapids, Mile 240

is rocky, and what soil there is is too shallow to be of any use. Beyond this the railway enters the so-called "clay-belt," indicated on the map of the Geological Survey as containing about 10,000 square miles. Many opinions have been given as to the value of this land for agricultural purposes. Mr. J. B. Tyrrell, a witness before the Select Committee referred to above, expressed the opinion, that there is "a magnificent stretch of country there and it extends westward along the Churchill. These lands north of Lake Winnipeg are clay lands, an extension of the same basin as the Manitoba clays." Mr. Tyrrell said he believed that that country, while a little harder to be settled, and not so productive to settlers who are looking for farms ready made and cleared for them and ready for planting to wheat, will be as fine an agricultural tract of land as there is in the northwest. Mr. William McInnes, geologist of the Geological Survey, said that "after leaving Split Lake, ascending the river, this clay-covered country shows absolutely no boulders and no gravel. . . . There is absolutely nothing to interfere with the cultivation of the soil there. It is a country that has been burnt over. . . . It has been subject to repeated burns. At the present time, it is covered by a very open forest. Grasses grow fairly luxuriant." Mr. McInnes said he did not mean to say that all of that 10,000 square miles was good land, but the basin characterized by this deposit of clay has an area of about the size mentioned. During the summer of 1910 an inspection of timber was made by J. R. Dickson, Assistant Inspector of Dominion Forest Reserves, along the proposed line of the Hudson Bay Railway. He traversed part of the clay belt and reported that it "contains

upon the whole from 50 per cent to 75 per cent of arable land and probably has a good agricultural future. The soil is exactly similar to that around Cochrane in New Ontario, which yields such large returns under right treatment." In order to make a practical test of the climatic and soil conditions of this land, the Department of Agriculture of Manitoba, in the Spring of the current year, opened up a small experimental plot, no returns of which have come to hand. While it is true that there are gardens wherever there are permanent residents, at Hudson Bay's Company posts and missions there is no farming, and it remains to be seen whether or not the greater proximity to tidewater will give these lands a value that will make them rivals to the more open lands on the prairies, of which there are still vast quantities unoccupied. Dr. John McDougall, quoted by Major Chambers in "The Unexploited West," says the district, "though wooded to a considerable degree, is a far more enticing agricultural proposition than that which faced the early settlers on the bush farms of Ontario and the eastern provinces fifty years ago." The day will undoubtedly come when a large agricultural community will be found in New Manitoba.

A Shorter World Route

Apart from the possibilities of agricultural development in New Manitoba, created by the successful operation of the Hudson Bay Railway, there is a large territory in Saskatchewan lying north of the great river which has given its name to the province and a still larger area along the upper stretches of the Peace and Mackenzie Rivers, where development is retarded by the lack of easy communication with the world's markets. Mr. Tyrrell, speaking of means of communication with the Peace River country, said: "If the Hudson Bay route was opened, it would be very much better than that—shipping to the European markets via Pacific ports. It would be very much shorter and a great deal of time would be saved. The people of Athabasca would be as much on the front as they are at Fort William."

Taking a very much larger view of the problems of communication and examining the broad question of the transportation of the world's supplies, it may be held that Hudson *did* make the great discovery. He was searching for a short route from England to the rich markets of China, and he died somewhere along the shores of the bay in disappointment at the apparent failure of his quest. He may not have failed. From England to eastern Asia via Suez is a distance of about 16,000 miles. By way of New York and San Francisco it is about 11,000 and by way of Seattle or Vancouver about 10,000, but by way of Port Nelson and Prince Rupert it is less than 8,000, and, to use the language of the North, "the portage" from Port Nelson to Prince Rupert is much shorter than that on either of the other systems. Posterity may credit Henry Hudson with success.

Comparison of the cost of building the railway with that of other enterprises to which the Canadians have set their hand should be made. The St. Lawrence channel has cost the Dominion Government about \$38,000,000. A harbor is being built at Toronto at an expenditure of \$20,000,000, and the reconstruction under way of the Welland ship canal will cost \$50,000,000. The estimated cost of the Hudson Bay Railway, including the terminals at The Pas and Port Nelson, is \$26,000,000. If for four months each year the transportation of the western crop can be expedited by having the distance to Europe reduced by one thousand miles, it is probable that the grain growers will insist that no obstacles be placed in the way of an early completion of the line. "Nothing but an actual test will ever prove which opinion about the northern route is right. The believers in the route await that test with absolute confidence."



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